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THE MONTEREY PINE.

THE GREAT TIMBER-TREE OF THE FUTURE.

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UNTIL quite recently the Monterey pine (*Pinus radiata*) was looked upon as quite valueless for any other purpose save that of the rapid production of shelter. Even at the present time the statement that it is by far the most valuable and profitable timber-tree that can be planted may, perhaps, not receive general acceptation. Nevertheless such a statement is absolutely correct, and can be amply substantiated by the results already secured in those localities where plantations have been converted into timber.

THE CONFUSION IN NOMENCLATURE.

The Monterey pine was originally described by Don, in the year 1836, under the name of *Pinus radiata*. Two years later it

was again described under the name of *Pinus insignis*, and it is by this designation that it is generally known in New Zealand. Thus, according to the botanical rules of priority the name *Pinus radiata* is the only correct one, and the specific designation *insignis* is merely a synonym. In point of fact, however, the translation of the botanical name *Pinus insignis* into the popular one has become so widespread that it is unlikely that the correct botanical title will ever be applied to this tree. Indeed, the name *insignis* so aptly describes the many valuable characters of this truly remarkable pine that it is a pity it cannot be rightly accepted as the correct one.

Pinus radiata is a native of Southern California, and grows naturally on dry rocky and sandy hills near the sea. It is confined to a few limited localities—namely, Pescadero, Monterey, and San Simeon on the mainland, and the outlying islands of Santa Rosa and Santa Cruz. It is especially abundant in the neighbourhood of Monterey, a locality that is also the home of another well-known tree, the macrocarpa (*Cupressus macrocarpa*).

The Monterey pine has now been introduced into nearly all those countries where it is hardy, but it is only in New Zealand, Australia, and South Africa that it has been utilized as a timber-tree. Its employment in forestry is now being adopted to a limited extent in Ireland and parts of England, but its real value is not properly appreciated outside Australasia.

EMPLOYMENT IN NEW ZEALAND.

The value of *Pinus radiata* for the rapid production of shelter and its adaptability to all types of soils was early demonstrated in New Zealand, and this tree rapidly became popular in the formation of plantations. It was employed, both pure and mixed, with other species; but owing to its overpoweringly rapid growth it is not suitable for mixed planting, a fact not even yet properly recognized. The pine plantations were primarily intended for shelter and breakwind purposes, and the idea that this tree was capable of producing valuable timber was not seriously considered. At best the timber of the Monterey pine was looked upon as inferior firewood. Thus there sprang up a decided prejudice against any extensive planting. It was thought better to employ those kinds that were considered in other countries to be valuable for timber-production. The estimation in which the timber of the Monterey pine was held can be well gauged by the fact that of the 20,000 acres planted by the Forestry Branch of the Lands and Survey Department there are roughly only 100 acres

devoted to this tree. The main plantation of some 70 acres is over twenty miles from a railway-line, and will be ready for conversion long before any other plantations in its vicinity, so that it could not have been planted with any idea that the trees would be worth converting.

PRESENT OPINION ON THE VALUE OF THE TIMBER.

During the past few years a great deal of timber has been cut out of the pine plantations in Canterbury. The uses to which it

S. B. Taylor, photo.] PINUS RADIATA IN CANTERBURY.

On the property of Mr. T. W. Adams, Greendale. Forty years old. Height, 127 ft.

has been put clearly indicate that *Pinus radiata* is among the most valuable trees that can be planted. Not only that, but its phenomenal rapidity of growth and great yield quite upset the general idea that small private plantations for timber-production alone will not pay for their cost of planting and maintenance. In fact, it can be shown that *Pinus radiata* will return quite large profits when grown on land the rental value of which is con-

siderably higher than that at which forestry has been thought to be a payable proposition.

Pinus radiata was first employed in housebuilding some thirty-seven years ago, when Mr. Cathcart Wason had some twenty-year-old trees converted into timber. With this material several houses and outbuildings were erected in the vicinity of Barr Hill, in Canterbury. These are still standing, and the timber, which has been kept painted, is still in an excellent state of preservation.

The advent of the travelling sawmill marked the commencement of the employment of pine timber for general constructional purposes. The farming community of Canterbury rapidly recognized the timber potentialities of their shelter plantations of *Pinus radiata*. As soon as conversion became practicable by means of the portable mill the adoption of pine timber for general requirements soon became popular. Several of these travelling mills are now annually employed during the winter converting *Pinus radiata* into timber, and many buildings have been erected during the past ten years. At first the timber was used mainly for rough outbuildings, such as stables, wool-sheds, and other farm buildings. During the past few years, however, many excellent residences, where *Pinus radiata* has taken the place of matai and rimu for all purposes except flooring, have been erected in various parts of Canterbury. Again, during the past year over two million feet of timber has been disposed of in Christchurch for box-making purposes, and the demand for this class of timber is so great that within a very few years all the mature plantations in the neighbourhood of the city will have been milled.

The great argument against *Pinus radiata* timber is that it is not durable. This is certainly true where the timber is in contact with the ground or is exposed to the weather in an unpainted condition. The buildings that have been erected, however, show that with ordinary care the timber, even from quite young trees, is extremely durable. Much of the pine timber at present available is not suited for general constructional purposes, owing to the knotty character of the wood. This is not to be wondered at when it is considered that the existing plantations were never intended to provide building-timber and were not planted under modern forestry conditions. It is indeed remarkable that plantations where the trees are often more than 12 ft. apart should be capable of yielding any constructional timber at all.

There seems no doubt that when *Pinus radiata* is planted for the express purpose of yielding building-timber excellent results will be obtained.

S. B. Taylor, photo.] METHOD OF FELLING.

The trees are cut close to the ground. This tree was quite isolated and still yielded excellent timber.

From the above it can be seen that considerable use is being made of *Pinus radiata* timber at the present time, and that the unwarrantable prejudice against its employment is rapidly becoming a thing of the past. Even if this very rapidly grown timber should prove to be inferior from the point of view of durability, the use of timber-preservatives should remove the only possible objection that can be raised against the planting of such a tree. Its great yield and rapidity of growth enable timber to be produced more cheaply than with any other tree, and this fact alone must place this pine in the forefront for afforestation purposes. Apart from building-timber, the growing consumption of box-timber in itself requires the extensive planting of some tree that will satisfy the future demand. In this respect *Pinus radiata* is especially suitable, and, were the timber useless for any other purpose, its production on a large scale would be more than justified.

THE FUTURE DEMAND FOR BOX-TIMBER.

A careful investigation of the timber required for the conveyance of agricultural and other industrial products results in the fact being disclosed that far more timber will be needed for these purposes than is now generally supposed. At the present time the demand for box-timber is quite an appreciable factor in the timber trade, and in future years no branch of timber-utilization will expand more rapidly. Again, adequate supplies of timber suitable for conveyance purposes are absolutely necessary for the successful prosecution of many of the agricultural and subsidiary industries on which New Zealand depends for its continued development and prosperity. In no other phase of industry would a timber shortage be more disastrous than in certain of the staple agricultural ones. Apart from any expansion in demand, fresh supplies of timber are constantly being required, for the life of conveyance-wood is extremely short, and should rightly end with the final disposal of the product conveyed.

The main conveyance-timber in use in New Zealand is the white-pine, and this will be one of the first of our natural timbers to become exhausted. When that time arrives, unless extensive plantings of rapidly maturing trees are immediately undertaken, the box-timber trade will either be supplanted by some substitute or else the whole of our conveyance-timber will have to be imported from overseas. Cheapness is essential in conveyance material, and if suitable timber can be grown locally cheaper than that imported, every endeavour should be made to avoid the importation of material that will directly cause a reduction in the profit of the

S. B. Taylor, photo.]

SECTION OF LOG SHOWING ANNUAL GROWTH-RINGS.

Diameter, 2½ ft. Age, twenty-seven years.

product conveyed. The cost of importation is the same whether the timber is a cheap or highly priced one, and this is an additional reason why our future supplies of conveyance-timber should be produced locally. Thus, for instance, an importation cost of 2s. per hundred increases the price of timber worth £1 per hundred by only 10 per cent.; whereas the same cost would increase the price of 10s. timber by 20 per cent.

The timber of *Pinus radiata* fulfils admirably all the requirements of box-timber. It is light, odourless, nails well, and has a clean attractive appearance. The experiments that have been conducted indicate that it is admirably adapted for the conveyance of dairy-products—in fact, there seems little doubt that *Pinus radiata* must become the conveyance-timber of the future.

From thirty to forty years will mark the final exhaustion of our natural forests, and the demand for box-timber will then have reached such great dimensions that if *Pinus radiata* is used for no other purpose than fulfilling this demand its immediate and extensive planting is more than justified.

In no other phase of timber utilization is there less likelihood of substitution occurring than in the box-timber trade. In future years the employment of brick, steel, and concrete must replace that of timber in much constructional work, but at present there is no indication that conveyance-timber, provided it can be procured freely and cheaply, will become replaced by any other material. This fact gives added emphasis to the importance of making rapid and immediate provision for the box-timber trade of the future. Undoubtedly one of the most important features of afforestation in New Zealand is the production of efficient conveyance-timber. Apparently the dominating idea of afforestation has hitherto been the production of high-class, comparatively slow-maturing, durable timber; whereas the future demand will be largely along the lines of a cheap conveyance-timber, and the supplying of this can be satisfactorily accomplished only with a rapid-growing and high-yielding timber such as that furnished by *Pinus radiata*.

Amount of Box-timber required.

The amount of box-timber that will be required annually at that period when the final exhaustion of our natural supplies is at hand is difficult to estimate. Some idea of the amount that will be necessary in the conveyance of agricultural and subsidiary products can, however, be arrived at by a consideration of the present trend of agricultural development in New Zealand. The main industries that will be large consumers of conveyance-timber will be the fruit

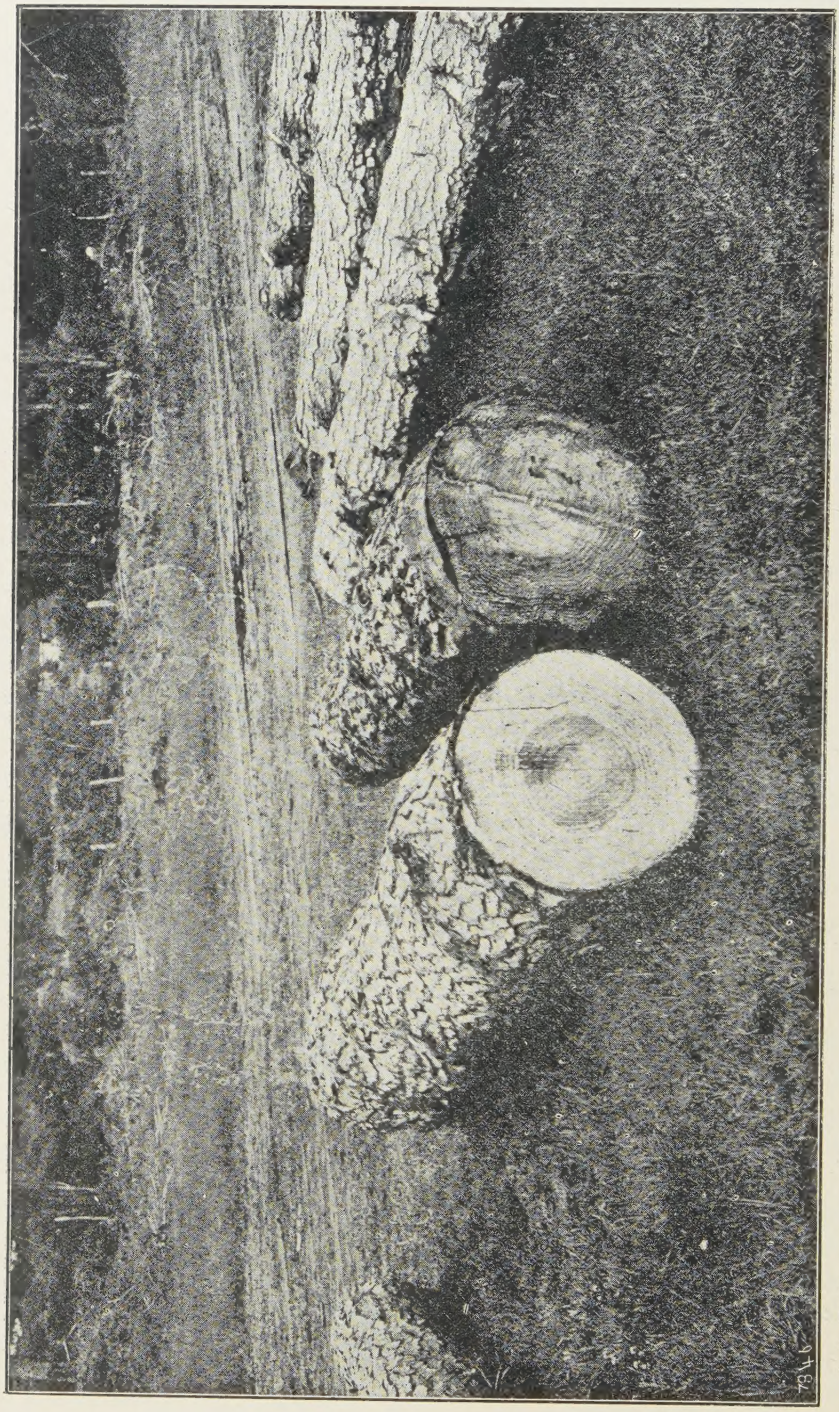
industry, the dairying industry, and subsidiary industries that are concerned with the elaboration of many products that are produced from the land.

THE FRUIT INDUSTRY.

There is every indication that the fruit industry will expand greatly within the next forty years. At the present time there are over 36,000 acres planted in fruit-trees, and an area of not less than 1,850 acres has been annually added to the orchards of New Zealand during the past four years. The prospects of both local and overseas markets are so encouraging that there appears no reason to doubt that this extension will be continued for many years to come. If the annual increase is estimated at 1,500 acres, then in forty years' time there will be at least 60,000 acres in full bearing. This calculation deducts the last seven years of the forty years' plantings as not in bearing, and allows only 10,500 acres of present orchards as being productive at the end of that period. It is generally conceded that 200 bushels (8,000 lb.) of marketable fruit is an average estimate of the fruit produced annually per acre from mature trees. Allowing 60,000 acres at 200 bushels per acre, there will be required annually in forty years at least 12,000,000 bushel cases, or their equivalent in smaller cases. The amount of timber required for a bushel case is about 36 superficial inches, and 12,000,000 cases would therefore require 36,000,000 superficial feet. Much of the fruit would be packed in smaller cases than bushel ones, and this will increase the amount of timber required. Again, in forty years' time the amount of timber required for conveying jams, preserved and dried fruits, tomatoes, and other elaborated orchard products will in all probability be very considerable, and may be put down at over 5,000,000 ft. Thus it does not appear to be too much to say that well over 40,000,000 superficial feet of timber will be annually required to market our orchard products. In fact, I consider that 45,000,000 ft. will by no means supply the fruit-case trade in forty years; but could accurate data be considered it would be possible to estimate very closely what the requirements will be. I would not be in the least surprised if the amount were culculated at 60,000,000 ft. per annum.

The net returns from the present-day commercial orchards are said to be so great that it is quite probable that the annual increase will go on expanding, and at the end of forty years the area under fruit will be very much greater than that arrived at by taking as a basis the figures for the past four years.

At the present time the price of bushel fruit-cases is roughly 6d. apiece, so that at present prices 12,000,000 cases would represent



S. B. Taylor, photo.]

LOGS READY FOR MILLING.

Cut from a twenty-seven-year-old plantation, planted 12 ft. apart.

£300,000. The cost of the converted timber used works out at nearly 14s. per hundred superficial feet. The production of fruit-case timber cut to size at 10s. per hundred would mean a direct saving to the fruit industry in forty years' time of £90,000 annually. It does not appear unreasonable to expect that *Pinus radiata* timber can be produced at this figure, as at the present time fruit-case timber of this pine is being sold at the mill in Canterbury at from 7s. to 8s. per 100 ft.

TYPE OF TIMBER REQUIRED.

Fruit-case timber should fulfil the following conditions:—

(1.) It should not cost more than 10s. per hundred delivered in the orchard.
(2.) It should be light. The timber for a bushel case should not weigh more than 8 lb.
(3.) It should be tough, with a fair amount of spring.
(4.) It should not warp.
(5.) It should be able to be nailed easily when seasoned.
(6.) The thickness required will depend on the strength of the wood used.
(7.) The timber need in no instance be wider than 10 in., and much of the timber used need not be as wide as this.
(8.) The colour of the timber is immaterial, but the whiter it is the more readily will the ordinary stencil-marks show out.
(9.) The timber used in no case should be more than $\frac{3}{4}$ in. in thickness. The majority should be less than $\frac{1}{2}$ in.
(10.) Durability is of no moment.

In detailing the timber required for fruit-cases it is highly desirable to work the amount of each to the certain definite widths that will be required. This is important in determining whether the conversion of small trees may be undertaken profitably.

Pinus radiata fulfils all the requirements for fruit-case timber to a marked degree. At the present time considerable amounts have been used for this purpose, and have given every satisfaction. Millers, however, are adverse to cutting fruit-case timber, as that for boxes of about $\frac{3}{4}$ in. thickness appears to yield them a greater profit.

THE DAIRYING INDUSTRY.

The dairy industry is one capable of considerable expansion. This may take place in three directions—(1) By an increase in the area devoted to dairying; (2) by an increase in the producing-capacity of the average cow; (3) by increasing the carrying-capacity of the land.

There is little doubt that the area devoted to dairying will increase considerably both in the direction of including land that is not yet under agricultural occupation (portions of Westland naturally suggest themselves for instance in this particular) and in the substitution of dairying for other branches of agriculture, especially on certain areas that will within a comparatively short time be cut up into smaller holdings. The evolution and development of both these methods of increasing the area devoted to dairying will have great significance on the amount of timber required in the conveyance of dairy-products.

One of the most potent factors in increasing the expansion of dairy-products will be the improvement of the butter-fat production of the average cow. The value of herd-testing in this direction has been well known for several decades, but its practice has only just been adopted in New Zealand. The general recognition of herd-testing is a matter of such importance that it is impossible to conceive that it will not receive the due attention of New Zealand farmers. Its general adoption, followed by the elimination of the least productive members of our herds, will have an immense bearing on the future supplies of dairy-products, even if the area devoted to them does not expand, and on the amount of timber that will be necessary to convey them to the consumers. In connection with herd-testing is included for the sake of convenience the adoption of proper methods of the breeding of high-producing types of animals.

For example, an average increase of 20 lb. of butter-fat per cow would mean an increase of production, from the number of cows at present being milked, of 13,800,000 lb. of butter, which would require nearly 246,300 butter-boxes; and as each box requires 6 ft. plus 5 per cent., the amount of extra timber required would be 1,551,690 superficial feet. Calculating the increase as cheese, an increase of 20 lb. of butter-fat would mean an increase of 30,000,000 lb. of cheese, or nearly three-fifths of that exported in 1910, requiring nearly 190,000 cheese-crates, representing 2,347,200 superficial feet. At 1s. a box for the butter-boxes the additional cost for conveyance-timber would amount to £12,300 annually. It must be borne in mind that an increase of 20 lb. is not nearly the amount that would be secured by proper and systematic herd-testing coupled with greater attention to the primal principles of breeding.

The great increase in the land-values in dairying districts is making it imperative that the utmost quantity of feed that can be raised per acre should be produced. In this connection lucerne appears in certain districts to be going to prove quite an important

S. B. Taylor, photo.]

LOGS FROM SINGLE TREE OF PINUS RADIATA TWENTY-SEVEN YEARS OLD.

These logs contain over 1,400 superficial feet of milled timber. Value, at 8s. 6d. per hundred, £6.

factor in the dairying expansion. All the factors that will lead to increased amounts of feed being available during the crucial periods of the year must be carefully collated before the determination of the probable increase in carrying-capacity of certain portions of the area devoted to dairying can be secured. All the factors above enumerated must have careful consideration before the quantity of timber required for the conveyance of dairy-produce—butter-boxes and cheese-crates—can be ascertained at any future date coincident either with that of the exhaustion of suitable timber or with that when the plantations for the supplying of this demand are first ready for conversion.

At the present time about 12,000,000 superficial feet are used in the conveyance of dairy-products, and there seems but little doubt that the amount will be trebled within the next thirty to forty years. If this be the case the dairy industry will then consume about 36,000,000 superficial feet of conveyance-timber annually.

Especial emphasis is always laid on the fact that butter-box timber must be quite odourless and not impart any flavour to the packed product. It is, of course, highly desirable that a timber fulfilling this condition should be grown, but it is not absolutely essential, inasmuch as many butters at the present day are conveyed in timber that has to be treated before it can be employed. Thus in deciding the timber that will have to be used when white-pine becomes exhausted the fact that it will have to be paraffined before being used should not throw it out of consideration. If a timber that needs paraffining can be produced at a much cheaper rate than an odourless one, then it will be a matter to decide which is the better to use from the point of view of the industry. It will be found that if a timber needing paraffining fulfils all the other requirements, and when prepared for use is a cheaper one than the non-paraffined one, there will be no object in using the more expensive timber.

Pinus radiata is apparently admirably suited for conversion into butter-boxes and cheese-crates provided the timber be free from knots. When grown under forestry conditions it should prove almost an ideal timber. It may perhaps be necessary to adopt paraffining, but this is really no objection provided the timber be cheap. There appears to be every indication that *Pinus radiata* butter-boxes and cheese-crates can be profitably produced at less cost than the present price of white-pine. If adequate planting be taken in hand the price is not likely to increase, whereas with the diminution in the supply of white-pine the price of that timber must increase.

SUBSIDIARY INDUSTRIES.

Subsidiary industries such as pickle-making, beer-bottling, and many other phases of industry concerned with the elaboration of agricultural products such as preserved meats, tallow, honey, poultry, eggs, and other commodities will require large amounts of timber for their conveyance. The whole of this demand can be admirably catered for with *Pinus radiata* timber. Thus, for instance, during the past season a single pickle company in Christchurch used over 600,000 ft. of *Pinus radiata* timber in the packing of its products. Twenty million feet does not in any way appear to be an overestimate of that required for these various subsidiary industries coincident with the final extinction of our natural timber resources.

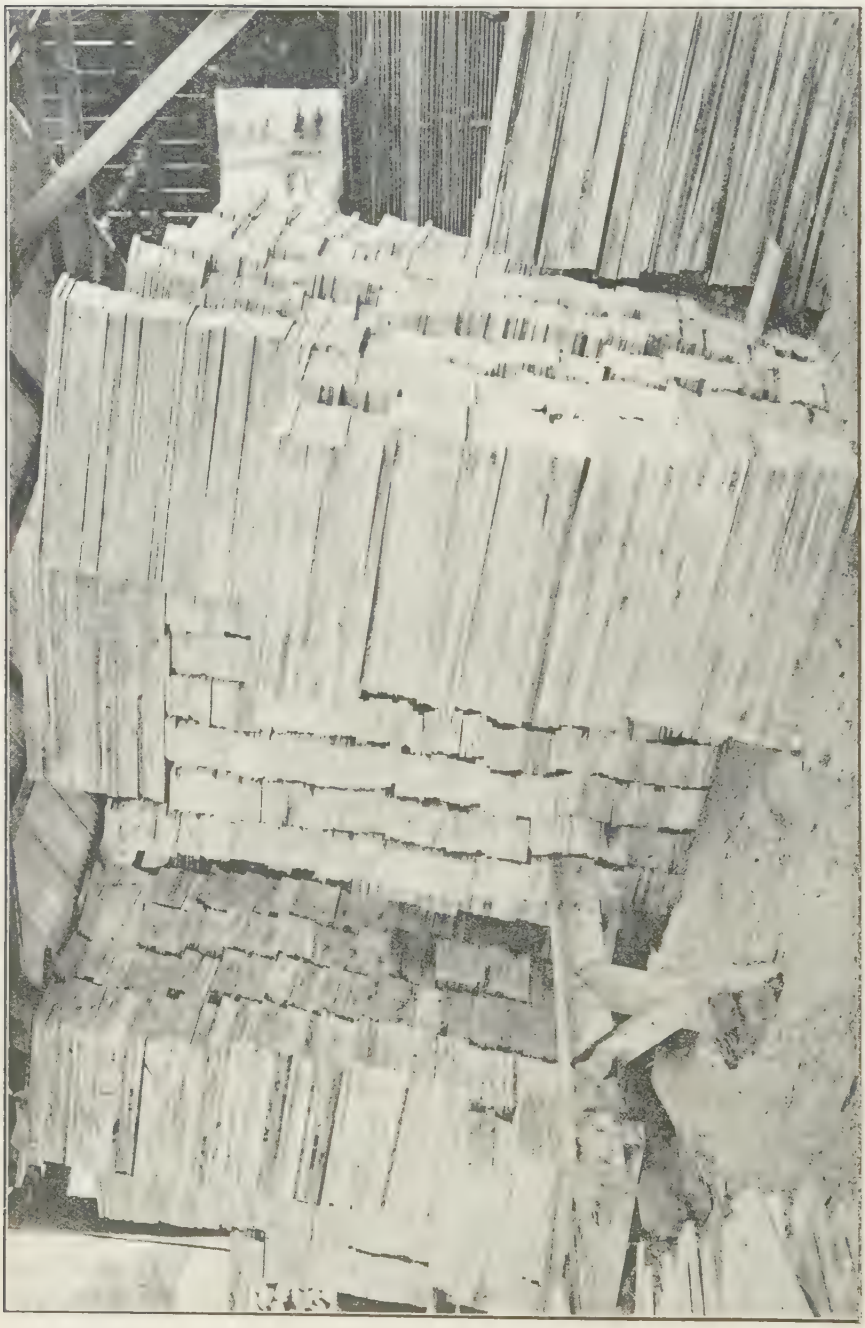
SIGNIFICANCE OF CONVEYANCE-TIMBER SUPPLIES.

At the very least, over 100,000,000 ft. of conveyance-timber will be required in the marketing of our agricultural products in the comparatively near future. Thus an immense amount of timber will be required annually; at present the demand represents nearly one-third of the present total timber-consumption of the Dominion. Added to this there will be required a very large amount of timber for the various industries that are not connected in any way with agriculture. These will help to swell appreciably the annual consumption of box-timber, so that this demand is destined to overshadow all other branches of timber-utilization.

So far as rural activity is concerned, the general trend is almost entirely in the direction of the production of commodities requiring timber for their conveyance to the consumer. To meet this great and rapidly growing demand no other tree seems better fitted than *Pinus radiata*; and one has little hesitation in forecasting that this pine must take its rightful place as the premier afforestation tree of the Dominion. Allowing a yield of 100,000 ft. per acre for plantations of from twenty-five to thirty years of age, the box-timber trade alone will require the milling of over 1,000 acres annually within the next thirty or forty years.

SEED.

Locally produced seed of *Pinus radiata* compares more than favourably with that imported from California. All the seed used in New Zealand is from locally grown trees, and a small export trade that bids fair to become of considerable dimensions is arising. In this particular the efforts of Messrs. Cooper and Sons (Limited), Wellington, are to be commended. This firm has fully recognized the capabilities of *Pinus radiata*, and has installed special drying-



BOX-TIMBER.

Cut from plantation twenty-seven years old. Yield, 100,000 ft. per acre, valued at £425.

S. B. Taylor, photo.

apparatus for the opening of the cones. The seed is cheap, and varies from 3s. 6d. a pound upwards, according to the quantity of the individual orders. The size of New-Zealand-grown seed is larger than that of imported, and 1 lb. averages about fourteen thousand seeds. The germination is generally high and often exceeds 80 per cent., but a germination of about 50 per cent. is what is generally obtained in the seed-beds. Thus each pound of seed produces about seven thousand plants, and the cost of the seed per hundred plants works out at less than 1d. Of course, where intending planters already possess mature plantations they can easily procure their own seed. As a general rule, however, unless the proposed plantations are large the purchasing of the seed will be found quite satisfactory, and this obviates the difficulty of seed-extraction. Farmers saving their own seed can, of course, select the trees from which the cones are collected, and in this way may procure those types that are most suitable for their particular locality.

The seedlings grow with extreme rapidity, and after "wrenching" can be planted out in their permanent location within eight or nine months after sowing. Many prefer to use two-year-old lined-out trees, but there is really no advantage, and the use of such nursery stock greatly increases the initial expense of plantation formation. "Wrenched" seedlings are generally sold at about £1 15s. per thousand, and many nurserymen supply and plant the trees at about £3 per thousand. For many who are planting only small areas this is the better method to adopt, but for the planting of large areas the growing of the young stock from seed is by far the more economical method of procedure.

YIELD PER ACRE.

There is very little reliable information available on the normal yield of *Pinus radiata* at different ages, and none whatever on the annual increment that occurs after the trees have reached the age of, say, twenty years. Data of this description are, of course, essential before it can be known what is the age at which it is most payable to convert, or what is the highest rental value of land that can be profitably employed in the growing of this crop. Again, the varying effects of close and wide planting on the yield of marketable timber at the end of definite periods is not known, and the yield of plantations managed under a proper system can only be surmised. The present plantations, although not planted under modern forestry conditions, give a very fair idea of what

may be expected. Their thorough investigation is a matter of great importance.

Many individual statements as to yield have been made from time to time, but these are in the main of little value, as they have too frequently been based on isolated measurements of trees that are larger than the average. Again, where plantations have been converted the area cut over has often not been properly ascertained, so that even in many of these cases the estimated yield is only guesswork. In the report of the Forestry Commission plantations thirty-five years old are estimated to yield 150,000 superficial feet of sawn timber per acre, but the estimation can only be a surmise, as few plantations of that age have been converted, and where they have been the trees have been from 10 ft. to 12 ft. apart. The danger of overestimating the yield when isolated measurements are employed is well exemplified in the following case. A single tree in a plantation was cut down and yielded 1,400 ft. of sawn timber. This would have represented 450,000 ft. per acre, whereas in reality the plantation yielded just on 100,000 superficial feet per acre. In this instance the trees varied in age from twenty-six to twenty-nine years. Another plantation near Christchurch that has recently been converted yielded 75,000 ft. of sawn timber and sixty cords of firewood per acre. The trees were planted 12 ft. apart and were approximately twenty-seven years old. Both these plantations were grown on pure sand, and the land was not suitable for any other agricultural purpose.

A yield of approximately 100,000 ft. of timber at thirty years of age appears to be about the average amount that is being produced in the present plantations. This is a very large yield, and greatly exceeds the final crop that is taken off any European planted forest of more than double the age. In fact, it is almost incredible to believe that such large yields are possible in such a short space of time were they not being actually obtained at the present time. Whether plantations thirty-five years old will on the average produce 150,000 ft. is perhaps doubtful, but certainly there must be a great increase in timber-development between the thirtieth and fortieth years. The cost of this timber is, however, so much greater than that produced in the earlier years of the rotation that it is perhaps not a good policy to wait for the larger gross returns that will be secured by increasing the duration of the crop.

Individual trees of over forty years of age often contain very large amounts of timber, and a single tree forty-six years old

recently measured in the Wairarapa was estimated to contain over 6,000 superficial feet of timber. Adjoining trees of the same age were, however, by no means so large and did not on the average contain more than 2,400 superficial feet. These trees had been planted in a row, and were naturally producing much more timber than if planted under ordinary forestry conditions. They, however, serve to show the very large amount of timber that a single tree of *Pinus radiata* is capable of producing. It is probable that plantations with the trees 8 ft. apart and containing roughly 650 trees per acre would produce from sixty to ninety thousand feet of timber within twenty years of planting. The individual trees would not be so large as those planted 12 ft. apart, but the timber would be less knotty and there would be considerably less waste per tree. Again, there would be just double the number of trees per acre, and each tree would need to furnish only 100 ft. of timber to produce 65,000 superficial feet per acre. Planted 12 ft. apart, plantations of twenty-seven years of age that have been converted have averaged 300 ft. of timber per tree, so that 100 ft. per tree twenty years old planted 8 ft. apart does not appear to be by any means an overestimate.

LENGTH OF ROTATION.

It has been noted that the greatest growth with *Pinus radiata* occurs in the early years of its development. Measurements recently made show that under favourable conditions a diameter growth of over 16 in. is obtained in the first twelve years. Ten-inch heartwood boards showing only eight annual rings are regular in the timber that is being converted at the present time. It may be said that such rapid growth precludes the possibility of the timber being durable, but for box-timber, at any rate, durability is of no moment. Great rapidity of growth when the trees are young would enable a short rotation being adopted, and timber produced in the early years of a plantation costs much less than that produced in later years. For this reason a comparatively small yield at from eighteen to twenty years might be much more profitable than a large yield at the end of forty years. The present plantations that are being converted are all in the neighbourhood of thirty years old, but there seems no reason why a shorter rotation when the timber is not required for building purposes should not be adopted. I am inclined to think that under many conditions an eighteen- to twenty-year rotation is quite sufficient for the production of conveyance-timber. A rotation as short as this, coupled with a reasonable yield, should enable *Pinus*

S. B. Taylor, photo.]

PLANTATION FROM WHICH TIMBER FOR MR. SOWDEN'S HOUSE WAS CUT.

Trees 6 ft. apart. Average diameter 4 ft. from ground, nearly 2 ft.

radiata to be grown with profit on land worth from £5 to £10 per acre. Such land has hitherto been considered far too valuable for timber-production, and if *Pinus radiata* can be grown profitably on land of that value it would prove the most remunerative crop that could be produced on inferior third-class country, as climatic rather than soil conditions appear to retard the development of this tree. The determination of the length of rotation will depend entirely on the yield at definite periods, and such information is at present not available. However, there is every indication that the shorter the rotation the greater will be the net return. In many cases, of course, partial cutting of an area might enable a longer

S. B. Taylor, photo.]

RESIDENCE OF MR. F. SOWDEN, AYLESBURY, CANTERBURY.
Built from *Pinus radiata* timber grown on the property.

rotation being profitably adopted, but so far as private plantations are concerned clear cutting appears to be the best method to adopt.

VARIATION IN TIMBER.

In examining a *Pinus radiata* plantation one is impressed by the fact that there is a great deal of individual variation in the trees, especially with regard to the amount and size of the side branches that are developed. Again, there appears to be a great variation in the timber produced from different trees growing under the same conditions. A miller recently informed me that the variation in the quality of the timber was very noticeable in the plantation he was converting. Certain trees were yielding timber that was far superior to that obtained from others. All the trees were grown under the same conditions, so that there appear to be different races of *Pinus radiata* producing different types of timber.

This variation in quality is most important, and warrants the fullest investigation. It is quite possible that plantations of one particular type might be very much better than ones consisting of a variety of different races. Careful selection carried out by milling certain trees, to ascertain the quality of the timber and using the seed from the tree that gives the best results, might immediately result in the production of a pure race of *Pinus radiata* that would yield much higher monetary returns than if ordinary mixed seed were used. The question of pure races of forest trees is dealt with in the report of the Forestry Commission, and its importance is rightly emphasized. The idea of utilizing the mill to determine from what special tree the seed should be selected appears to be a sound and practicable one. The fact that the tree is cut down does not affect this method to any extent. Sufficient seed can be secured after the tree is felled to produce a large plantation, as from seven to ten thousand plants can be raised from a single pound of *Pinus radiata*. Cone-formation takes place at a comparatively early age, so that an abundance of seed would be finally available. In no other branch of agriculture is the growing of pure races of more importance than in forestry, and single-tree selection is the only method by which this can be accomplished.

Freedom from Disease.

One of the most important considerations in the production of artificial forests is the use of those species that are not subject to serious diseases that may cause wholesale destruction during their development. With regard to *Pinus radiata*, it is singularly free from any serious insect or fungoid visitations. The ordinary pine chermes, *Chermaphis pinifoliæ*, is often abundant on young trees, but does not cause any appreciable injury, gradually disappearing after the trees are ten years old. The seedling trees are subject to attack by grass-grub (*Odontria* spp.), and care has to be taken in the raising of the young trees. The trees, however, are generally ready for planting in the same season as the seed is sown, so that there is not the same danger of infestation as with those trees that have to remain in the seed-beds for two seasons. No serious fungoid diseases have yet been recorded either in the young or adult trees, and this fact is of great importance. The stumps and wood when left on the ground are freely attacked by the native beetle, *Prionoplus reticularis*, so well known in the larval form in the timber of many of our indigenous trees under the Maori name of "huhu." Whether or not this beetle is likely to attack living *Pinus radiata* is not known, but so far it has restricted its attacks

to dead timber on which the bark adheres. In no case does this beetle appear to lay its eggs on sawn timber. No instances of borer attack (dry rot) have occurred in any of the timber that has been utilized up to the present time. The freedom of *Pinus radiata* from any serious injury by disease is one of its greatest recommendations.

PRIVATE AFFORESTATION.

Until recently I held the opinion that private afforestation did not in New Zealand offer sufficient inducements for any one to consider seriously the planting of trees for timber purposes. The great cost of labour, the long rotation with its attendant accumulation of compound interest, the inability to borrow money on the security of the plantation, together with the necessity of planting large areas, all appeared to preclude the individual from producing timber on a payable basis. In *Pinus radiata*, however, the private individual possesses a tree that considerably modifies all preconceived ideas. The rotation is shorter than with any other tree, the yield is considerably higher than that obtained with other planted forests, and even small areas can be profitably converted into timber. The Canterbury plantations that have been milled have all been small ones, and yet they have more than paid for their production even where the capital value of the land has been as high as £10 per acre. The production of a complete timber crop in from twenty to twenty-five years entirely alters the aspect of forestry so far as the private individual is concerned, and when the capabilities of *Pinus radiata* are properly recognized its cultivation as a timber crop should become a regular procedure by farmers possessing land adapted for afforestation purposes. Apart from any question of timber-production, an extension of plantation-work for shelter purposes is a matter of vital importance.

COST OF PRODUCTION.

In the report of the Forestry Commission the expenses of establishing a plantation are given at £8 per acre, and the annual maintenance charge is set down at 6s. per acre. In the following figures giving the cost of producing *Pinus radiata* plantations per acre the above expenditure is calculated at 5 per cent. compound interest. Although the Commission dealt with a large area, I think £8 per acre ample for the initial expenses of small plantations, as the private individual would in no case plant 2,700-odd trees per acre as has been done by the Forestry Branch. In many instances not more than 700 trees per acre is necessary where first-class building-timber is not the objective aimed at. So far as

S. B. Taylor, photo.]

TRAVELLING MILL IN CANTERBURY.

Used for converting *Pinus radiata*. This timber is being employed for farm buildings.

rent is concerned, 5 per cent. compound interest on the capital value of the land should be charged against the plantation. In the figures given below the rent represents 5 per cent. compound interest on each £1 capital value of the land.

Age of Plantation: Years.	Initial Expense and Maintenance.	Rent.
	£ s. d.	£ s. d.
15 ..	23 0 0 ..	1 3 0
20 ..	32 0 0 ..	1 15 0
25 ..	42 0 0 ..	2 10 0
28 ..	50 0 0 ..	3 1 0
30 ..	56 0 0 ..	3 10 0
35 ..	73 0 0 ..	4 14 0
40 ..	94 0 0 ..	6 6 0
50 ..	158 0 0 ..	11 0 0

If the standing timber of *Pinus radiata* is valued at 2s. per 100 ft., plantations of different ages grown on land worth £2 per acre would have to return the following yields to pay for their production :—

Years.	Superficial Feet.
15	25,300
20	35,500
25	47,000
28	56,100
30	63,000
35	82,400
40	106,600
50	180,000

It has been stated that twenty-year-old plantations should yield at least 65,000 ft. of timber per acre. Such a return at 2s. per hundred would show a net profit on £2-an-acre land of £1 per acre annually, plus 5 per cent. compound interest, during the whole period of the rotation. Such a return may appear to be excessive, but those obtained from the converted plantations in Canterbury fully justify the supposition that *Pinus radiata* is probably the most payable crop that can be grown, provided the land is of low value and that transport facilities to the consuming centres are good. One plantation near Christchurch planted twenty-seven years ago, at a cost of less than £6 per acre, on pure sand, the rental value of which was less than 2s., has yielded 80,000 ft. of timber per acre. There were no maintenance expenses in connection with this plantation, so that the total cost, calculated at

5 per cent. compound interest, was approximately £26 per acre. This makes the cost of growing the timber just on 6s. 6d. per 1,000 ft. Allowing a royalty of 1s. 6d. per hundred, a profit of £34 per acre would have been secured. This works out at a net profit per acre of over 11s. plus 5 per cent. compound interest per annum since the year the plantation was first established. Had the plantation been managed under proper forestry conditions the cost would have been higher, but an increased output of better-class timber would have more than counterbalanced the additional expenditure.

NOTE.—The frontispiece of this number of the *Journal* is of a *Pinus radiata* plantation growing on pure sand. Age, twenty-seven years. The plantation is yielding at the rate of 100,000 superficial feet per acre.

To disc after harvest, to harrow after rain, to plough deeply and in the autumn if possible, to have the land in the best condition to catch all winter rains, to sow selected and acclimated seed, to cultivate and cultivate again, to know the soil as a merchant knows his stock-room —these are the points which make for success in the dry country.—*Official Bulletin of the International Dry-farming Congress.*

Amongst the newly introduced cereals at the Ruakura Farm of Instruction there are some which may already be calculated to produce a profitable harvest. A Manchurian barley obtained from the Guelph College, Ontario, stands out as one possessing hardiness, vigour, and power to resist disease. Above all, it is a pure strain, and that is a great deal. Being a six-rowed variety, it should become a valuable feed barley. The crop of Black Hulless barley is a prominent one this season, and, though sown without any seed-treatment, it is perfectly free from smut. Cape barley sown alongside is badly affected by smut.—*A. W. Green.*

A Kimbolton subscriber, who has secured forty-two subscribers for the *Journal*, writes: "Some time ago I was talking to a gentleman about the *Journal*, but I could not induce him to subscribe to it. Later on, however, when visiting me, he happened to pick up a copy of the *Journal* that was lying about, and read an article on, I think, udder trouble in cows. A day or so afterwards one of his cows developed this trouble, and, remembering what he had read a short time before, he was able to put the matter right. He considers that that one article was worth at least £5 to him, and is now one of your most staunch supporters."

CONTAGIOUS MAMMITIS OR MASTITIS OF COWS.

C. J. REAKES, D.V.Sc., M.R.C.V.S.

THIS disease constitutes one of the most difficult problems confronting the dairy-farmer and the veterinarian at the present day. The general improvement in the milk-yielding capacity of dairy cows renders the animals more prone to udder troubles of this kind, and at the same time emphasizes the necessity for greater care on the part of their owners in the direction of using every preventive measure possible. The term "mammitis," or "mastitis," means simply inflammation of the udder, and the inflammatory condition may be set up by more than one cause. A most serious and most troublesome form is that resulting from contagion, seeing that it may be disseminated through several cows in a herd before the owner realises what is happening, and, what is worse, because no satisfactory and reliable curative treatment has yet been discovered, though highly trained and capable scientific investigators have been, and are still, working at the problem in all parts of the civilized world. The only persons who have committed themselves to the definite assertion that they can satisfactorily treat contagious mammitis are the vendors of patented preparations for its treatment, and these, it is presumed, make their business pay, the farmer finding the money therefor. But I cannot blame the farmer altogether for this. He is in a difficulty, and he tries to get out of it. However, the position is clear, and the reliable treatment for contagious mammitis has still to be discovered. Various forms of treatment have been experimented with, and practically every drug in the pharmacopœia likely to prove useful—in solution and as an injection into infected quarters—has been tried, with but little success, boracic acid in a 4-per-cent. solution still being the best, though not by any means so reliable as could be desired.

A considerable amount of research work has been and is still being done in the direction of endeavouring to find a wholly satisfactory method of vaccine treatment, but so far the hoped-for result has not been attained, though benefit appears to have been derived in some cases. Mr. Reid, bacteriologist to the Depart-

ment, is now engaged in elaborating a new vaccine, which it is hoped will be an improvement on those hitherto tried.

Meanwhile, preventive measures must be the sheet-anchor of the dairy-farmer, and these may be summarized as follows:—

PREVENTIVE MEASURES.

(1.) Any newly purchased cow should be carefully examined as soon as she comes on the farm. If her udder does not appear perfectly sound, or if the milk from any quarter does not appear perfectly normal (it should be drawn into a clear glass vessel for examination—an ordinary tumbler, for instance), the animal should be looked upon as suspicious, and no risk be taken of spreading possible infection from her to others. Even if everything appears right the cow should be milked last, after the remainder of the herd has been dealt with, for at least two weeks.

(2.) The udder and teats and the milk-yield of every cow in the herd should be examined daily for any indication of mammitis. These indications are,—

(*a.*) In the acute form of the disease the affected quarter is swollen, hot, and markedly inflamed. Pain is evinced when it is handled, and the production of milk is entirely suspended. Only a little fluid, usually thick and curdy in appearance and yellowish-brown in colour, but sometimes thin and watery, can be drawn away from the teat. The animal often shows constitutional symptoms in bad cases, being more or less off her feed and having a heightened temperature.

(*b.*) In the milder form there is perhaps only a slight hardness near the base of the teat, a thickening of the walls of the passage through the teat, a small hard lump present near the top of the teat, or a departure from the normal and natural appearance of the milk. If any of these appearances are noted the cow should be treated as a suspicious animal and a possible means of spreading infection through the medium of the milker's hands or the cups of the milking-machine. A sample of the milk from the suspected quarter should at once be sent to the Veterinary Laboratory, Wallaceville, for examination.

(3.) The udder and teats of every cow should be well washed with clean water immediately before each milking, and preferably at once dried with a clean soft towel. But the towel must always be a clean one. If allowed to accumulate dirt it may do more harm than good.

(4.) The floor, walls, and partitions of the milking-shed should be kept thoroughly clean, and the yard also kept in as cleanly a state as possible. Dirty surroundings aid the spread of contagious disease.

(5.) When a milking-machine is used, the cups should be well rinsed in clean, fresh water after being removed from each cow and before they are placed on another cow. This rinsing would be still more effective if an antiseptic were added to the water, but a difficulty exists in the fact that practically all effective antiseptics are either odorous or poisonous, and consequently unsuitable. A safe material is boracic acid, but this is too mild in its action to be altogether reliable for this purpose, especially if the same lot of boracic-acid solution be used with the whole of the cows dealt with at each milking; and I am afraid there would be a strong temptation to do this. If frequently changed it would be of benefit.

(6.) After each cow has been milked her teats should be immersed in as strong a solution of boracic acid as can be made. For this purpose a shallow vessel should be used, big enough to allow the teats to be covered with the fluid when the vessel is held up close to the udder. [NOTE.—A boracic-acid solution is recommended here solely on account of the fact that if carelessly handled by assistants, &c., in the milking-shed at milking-time it is not likely to do any serious harm. A 1-in-50 solution of Lysol, Jeyes' Fluid, or Izal would be more effective, but this necessarily needs handling with the greatest care when in the neighbourhood of buckets and open cans containing milk. Mr. Collins, Veterinary Officer at Hamilton, has found great benefit resulting from this practice on dairy farms where contagious mammitis was present in the herd.]

(7.) Every affected or suspicious cow should be kept back until all the healthy animals have been milked, and then milked by hand, the milker's hands being well washed in antiseptic solution immediately after milking out each animal.

TREATMENT OF AFFECTED COWS.

It is in the treatment of the disease that the greatest difficulty is met with.

When a cow is found to be affected with contagious mammitis (and any attack of mammitis should be looked upon as being probably contagious until a proper examination of the milk can be made) treatment on the following lines should be adopted.

In the *mild* form of the disease, the affected quarter or quarters should first be thoroughly milked out, a small quantity of non-poisonous sheep-dip or other good antiseptic being first put into the bucket. Also, the quarter and the teat must beforehand be washed with a 1-in-40 solution of some reliable disinfectant, as, for instance, Lysol, Jeyes' Fluid, or Izal. Thorough cleanliness throughout is essential if any success is to be hoped for. After each stripping of the quarter, it and the teat should be well rubbed with belladonna ointment. The entire treatment should be carried out at least twice daily, and if flaky, curdy-looking material comes away it is necessary to strip the quarter three or four times each day, care being taken slowly and carefully to endeavour to break down the mass of this material which tends to collect at the top of the teat. If the quarter appears to recover its healthy condition the cow should still be looked upon as a possible source of contagion through the medium of the milker's hands or the milking-machine cups, and no risk of spreading infection should be taken for at least six weeks after her apparent recovery.

In the *acute* form of the disease additional measures of treatment are necessary. As soon as the trouble is observed the cow should be given a drench composed of 10 oz. of Epsom salts, dissolved in 1½ pints of warm, thin gruel, with ½ oz. of powdered aniseed well shaken up in it. After first being well washed with a 1-in-40 solution of Lysol, Jeyes' Fluid, or Izal, the affected quarter or quarters should be stripped out as thoroughly as possible (disinfectant being first placed in the bucket) and then fomented with water as hot as the hand can bear. Fomentation will do no good unless carried out properly, and to do this two persons are needed. Following is the process: A small portable wash-tub, holding at least 8 gallons, should be filled with hot water, a piece of woollen material (a portion of an old blanket is good) soaked in it, then taken out, the excess of water wrung out from it, and then it should be applied to the quarter and held closely to the skin for about half a minute. Meanwhile, an assistant has a second piece of flannel soaking in the water, and when the first piece is ready to be removed from the quarter this is squeezed out and applied immediately the first is removed. The first piece is then again soaked and in due course reapplied. Thus a constant application of moist heat is obtained. The water used must be kept at the same heat throughout by adding boiling water from time to time as required. This necessitates a supply of boiling water being available close at hand.

The fomentation should be continued for fifteen minutes, then the skin of the quarter and the teat dried with a piece of dry flannel,

and, immediately after drying, belladonna ointment should be well rubbed in over the whole of the affected quarter and the teat. If this ointment is not available, olive-oil or lard is better than nothing. But the rubbing-in of something of this kind is necessary in order to prevent a chill following the hot-water treatment. Also, the quarter should be again stripped. This treatment must be carried out at least twice, and preferably three times, daily, and in favourable cases the heat and pain in the affected quarters will be considerably reduced in a couple of days. It is an important point that everything that can be drawn away from the quarter should be brought out, and the oftener the attempt to do this is made the better. Care should be taken to keep the bowels relaxed, and small doses of Epsom salts, 4 oz. daily, will prove valuable for this purpose; as in the mild form of mammitis, cleanliness in everything connected with the treatment is essential.

In severe cases it is always advisable to obtain the services of a qualified veterinary surgeon, if possible. It often happens that collections of matter form in the quarter, which may seriously affect the general health of the animal, and may even cause death, as a result of the absorption into the system of poisonous material from them. When matter is formed in this way it is necessary to lance the quarter in order to allow it to escape, and this can best be done by a qualified practitioner. The wound caused by this needs to be afterwards syringed out twice daily with an antiseptic fluid, such as a 1-in-60 mixture of Lysol, Jeyes' Fluid, or Izal, with water. In most cases of the acute form of the disease, and sometimes in milder cases, stripping the affected quarter is a difficult matter, often owing to the pain caused and also to the fact that the material to be drawn away is thick in consistency, and often full of flaky, curd-like matter. The getting-away of this would be facilitated if a little warm water (which has been boiled and allowed to cool down to blood-heat), with just a few drops of Lysol, Jeyes' Fluid, or Izal added, is injected up the teat, and the base of the quarter immediately afterwards gently massaged for a few minutes. Mr. Young, Veterinary Supervisor, has found this very useful in practice. But if this is done two things are absolutely necessary: first, that the teat-tube used be thoroughly clean—to ensure this it should just before be placed in boiling water for a few minutes; second, that the tube be not passed higher than the top of the teat. Unless these precautions are strictly observed more harm than good will be done. Many a cow which might otherwise have recovered has been ruined as a milker through the use of a contaminated teat-tube. Therefore, unless a farmer can be certain that the injection will be carried out properly in every respect, it

is better not to attempt it, but to trust to the other measures recommended. In any case the chances of complete recovery of the milk-producing faculty of a quarter affected with acute mammitis are not hopeful. Still, with good cows, treatment is worth trying.

One thing must be clearly remembered—viz., that every case of mammitis is not one of the contagious forms of the disease. Whether it is contagious or not cannot be determined by an ordinary examination—the use of the microscope is necessary to determine this question. This means time, and until the result of a microscopical examination is known the only safe course for the farmer to adopt is to treat each case as being probably contagious, and to take all preventive precautions accordingly. That a large proportion of cases do arise from ordinary causes is shown by the results of the examination of specimens of milk from suspected cows sent to the Wallaceville Laboratory. Last year, of 547 specimens sent, only 216 were found to be from cows suffering from the contagious form of the disease.

Following are instructions as to the proper method of collecting milk-samples for microscopical examination :—

First get an ordinary 6 oz. medicine-bottle. See that it is thoroughly cleaned, and fitted with a good, well-fitting cork. Place the bottle and the cork (but with the latter removed from the bottle) in a clean saucepan or other vessel containing cold water; see that the bottle is filled with the water, and place over a slow fire until the water boils. Then set aside, covered, until the water has cooled just sufficiently to enable the fingers to be put into it. Then lift the bottle by its lower end, and hold upside down until the contained water has all run out; pick up its cork by the top edge and fit tightly. This will ensure that the bottle is thoroughly sterilized.

In collecting the milk the udder and teats should be well washed with a solution in water of Lysol or other disinfectant, and afterwards rinsed with clean water; then, after first drawing away a little milk, fill the bottle direct from the teat; cork and seal it at once, put it into a secure package, and forward it by first post to the Wallaceville Laboratory, accompanied by a letter describing the condition of the cow from which the specimen was taken. No charge is made for the laboratory examination and report.

The system of adding dry, pure crushed linseed to the separated milk given to calves, and the feeding with crushed oats, has been continued at the Ruakura Farm of Instruction this season with the best results. Scour has been almost entirely absent.

NEW ZEALAND CHEESE.

DISPLAY OF DUNEDIN SHOW EXHIBITS IN LONDON.

Hon. T. Mackenzie, F.R.G.S., High Commissioner.

An exhibition of the cheese forwarded from the Dunedin Show was held at 43 Tooley Street, London S.E., from the 6th to the 10th October. From the accompanying illustrations it will be seen that the cheese was staged and other details arranged as nearly as possible on the New Zealand principle of staging cheese for show purposes.

Through the kindness and courtesy of the proprietors of Hay's and Cotton's wharfs a large room was placed at my disposal, rent-free, for the week of the exhibition. All reasonable effort was made to advise the trade generally of the display of cheese not only in London, but in other parts of England, Scotland, and Ireland. This was done by means of circular letters and advertising in the *Grocer and Oil Trades Review*. During the week we were favoured with a steady stream of visitors, included among whom were representatives of all the leading provision houses in London as well as others from the provinces.

The quality and get-up of the cheese was commented upon very favourably by all those who called, and, generally speaking, the exhibition created a very considerable amount of interest among those engaged in the dairy-produce trade, the opinion being freely expressed that if our producers of dairy-produce would lay themselves out to supply cheese right through the season of a quality such as was seen in the Dunedin Show cheese exhibits it would be to the mutual advantage of trader and producer alike, and would also mean enhanced values for the produce.

Advantage was taken of this exhibition by me to meet representatives of the leading provision houses, and at my invitation a large number met at 3 p.m. on Wednesday, the 8th October, with the result that a good deal of discussion took place regarding the quality of New Zealand dairy-produce.

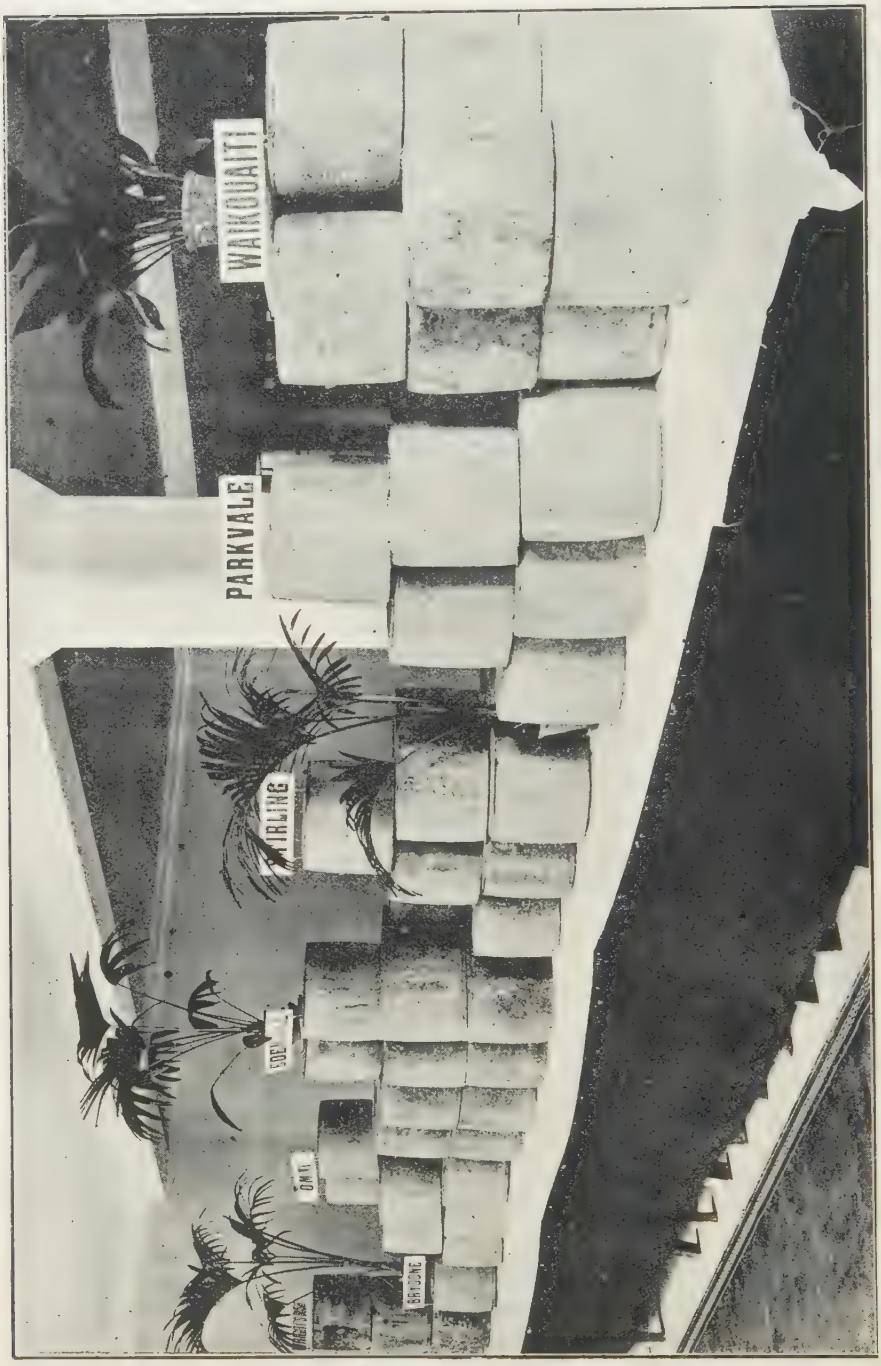


EXHIBIT OF WHITE CHEESE.

Exhibit of Coloured Cheese.

The following extracts indicate the opinion of the trade as regards the quality of the cheese :—

From the *Grocer and Oil Trades Review* :—

"*New Zealand Cheese.*—The exhibition of New Zealand Cheddar cheese held at Hay's wharf this week aroused considerable interest in the trade. It will be remembered that last season the quality of New Zealand cheese gave rise to considerable adverse comment, and the strong protests that were made in this country found their way to New Zealand. The exhibits of cheese this week gave general satisfaction, and if this standard of quality is aimed at and maintained in the coming season the efforts of cheesemakers in New Zealand will be duly appreciated on this side.

"At the meeting held on Wednesday, and reported on another page, criticism was offered in regard to the indifferent quality of last season's make, but the speech of the High Commissioner for New Zealand, the Hon. Thomas Mackenzie, indicates that the authorities in New Zealand are fully alive to the necessity of maintaining a high standard of quality for the goods, and will endeavour to meet the requirements of the English trade. It has to be said that New Zealand produce in the past has gained a high reputation in this country. Consequently it would be deplorable that any temporary carelessness in manutacture should jeopardize the future of so important an industry."

From Messrs. Samuel Page and Son's weekly market report :—

"We have this week had the privilege of inspecting eight brands of New Zealand cheese, both white and coloured, sent on here from the Dunedin Dairy Show, and the factories are to be congratulated on the excellence of their product in every respect."

From the New Zealand Loan and Mercantile Agency Company's weekly market report :—

"The New Zealand Government is exhibiting this week, at 43 Tooley Street, a quantity of New Zealand cheese which has been received from the exhibition in Dunedin. The cheese is of last March make, and its quality and appearance reflect great credit on the factories concerned, which are about six in number. The manufacture of such quality throughout the season, whether of cheese sold on contract or sent on consignment, is the surest way to maintain the reputation and position of New Zealand cheese on the Home markets."

I am of opinion that the exhibition just closed will prove advantageous to New Zealand exporters of dairy-produce. It proves conclusively that our cheesemakers can make a cheese that is closely akin in quality to the high-grade English Cheddar type, and not only can they make the cheese, but have further illustrated that the cheese can be marketed here in first-class order, absolutely free from any of the damage sustained during transit from New Zealand, such as was of rather frequent occurrence during last season—I refer to heated cheese and soft crowns. Further, although it is recognized that the cheese had been specially made

NO. 43 TOOLEY STREET, LONDON S.E., WHERE THE EXHIBITION WAS HELD.

for show purposes, and that they had been well cared for here—having been stored at the Surrey Commercial Docks at a temperature of from 40° to 45° F. since arrival—yet the fact remains that cheese of the Dunedin Show cheese standard is the kind that is wanted by the trade here; at least, that is the only conclusion that one can come to after listening to the opinion expressed by the leading merchants.

I would recommend that this exhibition of show cheese should become an annual fixture, at least for a few years, and that the place of exhibition of the cheese in the United Kingdom should be migratory. If such a programme could be carried out it would be of considerable value to the New Zealand dairy industry.

SAND RECLAMATION.

TREATMENT RECOMMENDED FOR WESTLAND.

A. MACPHERSON.

AN investigation into the cause and treatment of a serious sand-drift on Native Reserve Section 44, at West Wanganui (Westland), was undertaken by the Department during the latter part of last year.

From the meagre particulars available it is not clear as to whether the drifting of the sand began recently or whether it has been going on for many years but is only now making serious inroads on to pastoral land. In the absence of any knowledge of the local conditions and environment it is difficult to advise as to the best methods of stopping this particular nuisance.

The cause of a great many of the recent sand-drifts throughout the Dominion has been the breaking of the covering which nature through the centuries has formed over the stretches along the sea-littoral and river-banks. Whereas in many cases this covering comprised forest or scrub, the agency of man with axe and fire has rendered these areas naked of the surest means of controlling the inroads of the sand. Where the protective covering was turf or other vegetation the grazing of cattle or sheep by wearing away the surface with their continual tramping, or the presence of the rabbit with its natural habit of burrowing, has ruined nature's

covering and exposed the loose sand beneath. With the surface once broken the sand begins to move, and the breaks in the surface increase and extend in size with the action of winds until the whole becomes a moving sand-drift, carrying devastation inland with every favourable wind that blows. When sand-drifts occur under such conditions or through such agencies the further destruction of nature's covering should be stopped, the growth of trees, scrub, or any vegetation encouraged, while grazing and burrowing animals should be rigidly excluded from the surrounding sand area.

No matter what the primary cause of a sand-drift may be—whether through the encroachment of the sea on to the mainland, the accumulation along the coast of large quantities through the action of the tides (as is the case in certain localities), the action of rivers conveying it from the highlands, or the reversion of dunes or sand areas to their original state through the destruction of the protective covering—the first step necessary to arrest and control the drift must be in the direction of protection where there is encroachment, and reclamation, which latter, to have the desired effect, must start nearest to the source of supply.

It is assumed that the sand-drift on to the Native Reserve, Section 44, West Wanganui, had its starting-point from the seashore; therefore the planting of marram-grass (*Ammophila arenaria*) above high-water mark on the windward side of the drift is the first step. This should be planted in a wide belt in rows at right angles to the prevailing wind. It has been conclusively proved in many countries, after years of effort and endless expense, that shifting sand cannot be successfully controlled by artificial barriers, such as fences of boards or brush. They serve to check the advance for a time, but later are covered and rendered useless. The sand can be permanently secured only by planting or sowing grasses, to be followed by shrubs and trees, the latter to be grown from seeds sown on the dune after the marram-grass has been established, or in some instances planted in the sand.

Marram-grass is able to withstand the action of the sand and wind, more especially when it is planted close together, but it stands neither salt water nor the sea-spray. It has extensive creeping and much-branched underground stems—rhizomes—which interlace and develop fine root-fibres, forming a mat all through the sand and so binding it. The grass continues to grow and to develop new roots and increase in height as the dunes become higher. Wherever a patch of marram-grass takes root, there the sand blown from the region of the greatest supply gathers around it, and as the sand spreads the grass grows through it until the

hard dry blades form the nucleus of thousands of tons of sand. A characteristic of the plant is that when the sand tends to cover it up its height growth is stimulated in order to keep its tip above the sand.

On sand periodically flooded by sea-water, sometimes dry and sometimes wet, sea lyme-grass (*Elymus arenarius*) is the best species for this purpose. The sea-dykes of Holland are made of the sand bound together by this grass. It grows well in sand, and is not injured by salt or salt water. It has long underground stems—so long and extensively branched that they can mat together and consolidate blowing sand.

To prevent encroachment on the land by the sea and by blowing sand the sea lyme-grass should be planted on those sands within reach of the sea and the marram-grass on those farther back.

For propagating sea lyme-grass on sandy shores cuttings are dibbled into the sand in spring to a depth of 6 in. to 10 in. Care should be taken that the cuttings are not covered over by the blown sand. Seeds also are used for reproducing the plants. In such a case the best plan is to deposit turf at regular and short intervals, and the seeds of the sea lyme-grass mixed with clay dibbled in at the rate of 20 lb. per acre.

The planting of marram-grass should be carried out during autumn, winter, or early spring, and should be done at a time when, as a rule, no violent winds are experienced in the district. The planting should be done with a plough, spade, shovel, or specially made dibble. The plants used should be fresh and as full of vigour as possible. If the plants are supplied for planting in bunches just as dug up it will be necessary to pull the bunch to pieces, care being taken that no piece is planted without having leaves, and the stem must have one or two nodes or joints. These latter are essential, as from these the roots form.

It is usual to plant in one hole from three to six or more of these pieces, and to a depth of 6 in. to 10 in. The planting should be done in rows about 2 ft. apart, and the plants or bunches of plants 2 ft. between in the row. The rows should be at right angles to the prevailing wind. Care should be taken not to plant the bunches one behind the other, but alternately in adjacent rows, thus the plants will form a continuous break against the prevailing wind.

Grasses are the first plants in the natural process of reclamation of sand-dunes, and by means of these the movement of the sand can easily be stopped. After this is accomplished shrubs and trees should be planted.

APPLE LEAF-SPOT.

A. H. COCKAYNE.

LEAF-SPOTTING has been extremely prevalent in apple-orchards during the present year. Quite a variety of causes appear to be operating in producing this condition. In many cases spray injury has been the primal cause, but extensive spotting has also occurred on trees where no spraying has been carried out. Several fungi, notably *Septoria piricola* and a species of *Alternaria*, are regularly found on the brown, dry, dead patches, but these appear to invade the tissues only after the leaves have been weakened or damaged by some adverse condition either of the soil or climate. Mature apple-leaves that are apparently quite healthy may in reality contain many minute wounds on the surface, and at these points certain semi-parasitic fungi are liable to gain an entrance. A good deal of spray injury may also occur on such leaves, as the wounded surface easily allows the penetration of the spray into the tissues, and disorganization of the cell-contents occurs, leading to the formation of dry, dead patches. These spray-injury spots are frequently invaded at a later date by many species of fungi that rapidly increase the affected areas, and finally may cause more or less complete defoliation of the tree, at times weeks after the spray has been applied.

Both spray injury and leaf-spotting due to fungi alone are most intense on the more tender varieties such as Cox's Orange Pippin and Scarlet Nonpareil. Adverse climatic conditions appear to affect the foliage of such varieties more readily than they do the more robust and hardier kinds, and thus it becomes more subject to injury both by sprays and fungi. Bordeaux mixture and lime-sulphur solution have been equally to blame for the extensive spray injury that has occurred, although where the lime-sulphur has been sufficiently diluted very little injury has resulted; whereas in many cases 2-3-40 Bordeaux has led to extensive spotting on the more tender varieties.

Correspondents with any office or branch of the Department are requested to write their names and *full postal addresses* in a clear and unmistakable manner. By doing so they will often avoid much trouble and annoyance, and at the same time will ensure the proper delivery of departmental replies.

BITTER-PIT.

W. H. TAYLOR.

THE recent report from Britain as to the relation of weather-conditions to bitter-pit has been borne out by an experience at the Weraroa Experimental Farm. The Home report in question stated that when a cold season was experienced in the north of England bitter-pit was practically non-existent, but in the same season the summer was exceptionally hot in the south of England, and there bitter-pit was common. I have noticed the same thing at Weraroa, where in a cool summer bitter-pit gave no trouble, whereas in a hot season the disease was prevalent. It has been contended that the trouble is due to overpruning, and that if fruit-trees be only lightly pruned or left to make a natural growth the trouble would never be noticeable. My experience does not bear this out. The worst case of bitter-pit I have come across was with a number of apple-trees (which it was intended to replace with trees of other varieties of fruit) which were left unpruned for two years.

[I have known apple-trees twenty-seven years of age practically unpruned for eight or ten years on which all the fruit was badly affected by bitter-pit.—*J. A. Campbell.*]

NEW POTATO DISEASE.

A NEW disease, silver scurf (*Spondylocladium harix*) has recently been introduced from Europe and is reported spreading in eastern States of the United States of America. This disease is marked plainly by dark areas on skin of tuber, which when examined very closely may be seen spotted with fine black hairs. This fungus does not in any way produce a decay of the potato, but after the skin is killed there is a rapid loss of moisture, and the tubers shrivel and take on a silvery appearance, greatly lessening market value. The information is culled from the *Panama Morning Journal*, and is sent by a New-Zealander as a warning to those interested in preventing its introduction to New Zealand.—*H. V. Garland, Ancon, Canal Zone, Panama.*

MANURIAL REQUIREMENTS.

RESULT OF TWO YEARS' OBSERVATIONS AT RUAKURA.

PRIMROSE MCCONNELL.

Two years is but a short time—altogether too short—to deal with a soil in the matter of its manurial requirements. The experiments carried out by the writer during the past two years at the Ruakura Farm of Instruction are to some extent tentative only, and yet they are sufficiently conclusive to form a guide for future work.

An experimenter, if he wishes to succeed, must lay aside all bias, scientific and otherwise. In fact, he must ignore to some extent the cast-iron teachings of both practice and science, and be prepared to experiment on lines that will at times provoke the ridicule of both the scientist and the purely practical man.

After all, how much do we really know of soil science? And how ignorant we still are of many of the laws that determine a soil's fertility; or, as it is tersely put by one of the most famous agricultural scientists of the present day, "between conclusions and suppositions, between what is old and what is new, between what is sought to be found out and what is already found out, there appears to be no little confusion."

For many years the belief obtained that it was possible to determine the manurial requirements of a plant by the aid of an analysis of the plant itself. Experience, however, teaches us that there seems to be little connection between the two; and even soil-analysis is not infallible as a guide to successful manuring. In attempting to study the soil from a purely scientific standpoint the layman is confronted with the fact that scientists are more at variance on this subject than on any other connected with agriculture. As an instance, among others, I might mention the legume-nodule-bacteria theory. Some scientists maintain that bacteria having the power to fix atmospheric nitrogen exist in the active stage of legume nodules; while others maintain that such a theory has no foundation in fact, and have even demonstrated by experiment that an increase of nitrogen has been found in soil in which had been grown a legume crop whose roots carried no nodules. They also

maintain that an artificial culture made from legume nodules in their active stage is valueless for inoculation purposes; as they contain no bacteria whatever until the process of decay sets in, when, as in all decaying matter, they are in abundance.

The writer has carried out several experiments with these cultures, and has closely followed up experiments carried out in other parts of the world. In no instance has clear evidence offered that the artificial culture is of any value for inoculation purposes. My object in citing the above is not by any means to discredit the work of the scientist, but merely to emphasize what I have already stated—*i.e.*, that the experimenter, if desirous of any degree of success in a comparatively short space of time, must lay bias aside completely and beware of dogmatizing. He will, of course, be immeasureably assisted by an intimate knowledge of the science of chemistry, botany, &c.—in fact, by all sciences that may be applied in the treatment of soils; but he must above all things be a keen observer, and he will possibly in the meantime have more success in soil-treatment through macroscopic rather than microscopic observation, because many of the results achieved by the latter are as yet too conflicting to be accepted as reliable guides, whatever they may be in the future. Although the value of the microscope is incalculable, and no real progress could be made in its absence, yet an eminent scientist freely admits that under very high powers of the microscope occasional explanations are given that may be the result of an optical illusion.

It is well, at the same time, to recognize that science does not admit impossibilities, and the future may be pregnant with great scientific discoveries; also that the highest practice cannot be other than scientific—the two are inseparable—although what is termed scientific may be occasionally unpractical.

Nitrogen.

The writer has always contended that, generally speaking, New Zealand soils contain abundance of this ingredient, and that a little care in rotation cropping is sufficient to ensure a continued supply. Experiments at this station all tend to prove this.

In last year's swede experiments, for instance, the plots fertilized with phosphates and potash gave a considerably greater yield than those to which a complete manure (containing nitrate of soda) was applied. The same plots are this season growing a crop of oats, unmanured, and depending on the residue of the manures left by the swede crop. So far as the eye can judge at present, the same

results will be obtained from the oats as from the swedes—viz., the plots that received a complete manuring for the swede crop will again be behind those that received phosphoric acid and potash only. This result is doubly conclusive from the fact that not only did the oat crop receive no manure of any kind, but the swedes, roots and tops, were carted off and consumed on another field, thus doing away with all *known* means of renewing the supply of nitrogen in the soil. I am quite convinced that the leaves of swedes assimilate atmospheric nitrogen, and that on many soils they are of the utmost value when ploughed under. When a soil is lacking in nitrogen the swede-leaves will to some extent renew the supply; but in this instance the tops were carted off, and yet there is evidence at the present moment that the soil still contains a great reserve of nitrogen.

The history of this field, as shown by the field-book, gives no evidence of the application, at any time, of a highly nitrogenous manure, such as nitrate of soda or sulphate of ammonia. Two years ago the field was cropped with mangels, all of which were carted off as in the case of the swedes. The question, then, naturally arises, How is the supply of nitrogen maintained under the circumstances? Is it not possible that the soil has some other means of keeping up the supply that has not yet been brought to light?

Nitrogenous manures in the forms of sulphate of ammonia, nitrate of soda, and nitrolim have been applied to every description of crop grown at this station during the past two years without apparent result. It is but reasonable to conclude that New Zealand farmers should be very careful in the application of highly nitrogenous manures. They are extremely costly in any case, and more so when they are applied to soils which do not require them.

PHOSPHORIC ACID.

The uniformly good results obtained from the application to this soil of phosphoric acid, particularly in the form of basic slag and guanos, obviate the necessity of making any lengthy statement on the matter. One fact stands out very clearly—viz., that comparatively insoluble manures, such as basic slag and some of the guanos, are as readily assimilated by the plant as the more soluble manures, such as superphosphate, *provided the grinding or division of the particles has been sufficiently fine.* This fact has been brought to light by practical experiment years ago, and acted on by practical men in the face of scientific teaching to the contrary. For years the scientific camp was divided on this matter, and the

unbelievers—most eminent scientists—were reluctantly convinced after a seven-years dispute, which was called "the battle of the phosphates."

One of the most prominent research associations in Britain, after many years of experimental work carried out with the utmost care, has not only proved that comparatively insoluble manures are as easily assimilated as the more soluble, but also explains how this comes about. It is stated that there is an aperture at the extremity of the root-hairs, and by this means the plant assimilates the less soluble manures, *provided*, as stated above, *that the division is fine enough*. It matters little whether this explanation is accepted or not, because the fact still remains that so-called "insoluble" manures are readily available, and during the past two years it has been one of the most outstanding results of the experimental work at this station. In Scotland, in particular, the less soluble phosphate is superseding the soluble, which means a very considerable yearly saving to the farmer.

At this station some of the best results have been obtained from slag and guano, applied separately and together, without the addition of potash or nitrogen; and a mixture of Seychelles Island guano and basic slag has invariably been used with excellent results in the cultivation of lucerne. This guano seems to be particularly suitable for the soil here, and it is unfortunate that there is none now available in New Zealand, it having been bought up by an outside syndicate.

Last season Malden Island guano alone gave the highest yield of swedes; and this season, among various manures and mixtures, the Seychelles Island variety is giving the best results on the rape crop, even better than superphosphate and bonedust, although the latter must be accepted as a first-class mixture. Indeed, when the manure-merchant is brought to see the desirability of grinding bones as finely as the highest-grade basic slag, bone manure will become almost invaluable.

It has also been abundantly proved at this station, and over the whole agricultural world, that the continued application of the more soluble, and hence more acid, phosphates stimulates many of the plant fungoid diseases, such as "club-root," in swedes, turnips, rape, &c.

At the Moumahaki Experimental Farm the writer carried out experiments with separate dressings of basic slag, basic superphosphate, and superphosphate on a number of varieties of swedes, and also on rape and kale. These experiments proved conclusively that the application of superphosphate greatly increased the per-

centage of roots affected with "club-root," while the roots in the basic-slag plot were almost exempt from that disease. So far as this station is concerned, phosphoric acid must be the main ingredient in all manurial applications, and a similar conclusion may safely be applied to New Zealand soils generally.

POTASH.

So far, comparatively little result, good or bad, has been obtained from the application of potash at Ruakura, except in the case of the potato and mangel crops, which make some response to an application of this ingredient. In some instances, also, there has been a slight increase in the weight of oat straw as a result of a slight dressing of kainit.

This ingredient has been applied in various forms, such as kainit, sulphate, muriate, and nitrate, and there are now in being very extensive experiments, which will be reported on later. So far the evidence available seems to prove that the average soil at this farm contains at present a sufficiency of available potash for the majority of farm crops.

LIME.

All experiments prove that although lime may not be accepted as a direct plant-food, yet where it is not present in the soil in sufficient quantity other manures are, to a great extent, applied in vain. Hence it may be accepted as one of the main essentials in successful manuring.

The experiments at this station seem to prove that, particularly on the raw and apparently more sterile parts of the farm, an application of lime, together with draining, is all that is required to bring such soil into a profitable state of cultivation, and that manures applied previously to the application of lime were to a considerable extent wasted. A paddock of the foregoing description was sown with clovers and a little timothy eighteen months ago, and manured with basic slag — 5 cwt. per acre. As an experiment, a strip right across the field was further dressed with carbonate of lime —1 ton per acre. The result is most pronounced. Where the dressing consisted of slag only, sorrel predominates; but where lime was added there is a fine stand of clovers which can be clearly seen from a considerable distance.

This experiment should also do something to dispel the fallacious idea that basic slag contains sufficient lime to correct the acidity in very acid soils, such as that under discussion.

On the other hand, lime applied to comparatively poor, but higher, land had no apparent result, while on the richer low pastures, now in high condition, it has been applied with the very best results.

In all districts where freight is not an obstacle lime should be applied in the carbonate form, because of its less exhausting nature as compared with burned lime.

Some farmers make the mistake of applying gypsum with the object of correcting soil acidity, when, correctly speaking, gypsum contains no lime, as the calcium is in combination with sulphuric acid, and is thus sulphate of lime. Indeed, the application of gypsum has the effect of increasing instead of decreasing the soil acidity.

At the Pennsylvania Experiment Station experiments with carbonate *versus* burned lime were carried out for twenty successive years (1882–1901), and the reports state that "with every product a greater total yield had been obtained from the plots treated with carbonate of lime than from those treated with burned lime. Furthermore, with every product whose total yield for the last eight years was *greater* than the total yield for the first eight years the carbonate produced a greater increase than the burned lime; and with every product whose total yield for the last eight years was *less* than the total yield for the first eight years the decrease was less where carbonate was used than where burned lime was applied (oat straw alone excepted). This is even more significant in that it demonstrates the tendency of burned lime with continued use to exhaust or destroy the fertility of the soil."

There is a tendency in New Zealand at the present day to resort to liming on a more extensive scale, which is in every way commendable. It is, however, a procedure which should be carried out with the greatest care, and in the writer's opinion carbonate only should be used. The machinery as yet in use for grinding the limestone is very crude. Much better results would undoubtedly be had if the material were supplied in a finer state of division.

Sulphur.

The Research Association, at Aberdeen, Scotland, which has at its head one of the ablest agricultural scientists of the present day, claims to have reduced the number of minerals essential to plants to five, by the exclusion of sulphur and chlorine. Other very eminent scientists maintain that sulphur is an essential element in plant and animal nutrition.

Whether it be a plant-food or not matters very little. The fact remains that it has been applied to various crops at this station during the past two years with very marked effect. Perhaps the least-looked-for and the most remarkable result is on pasture, a small area of which was top-dressed with sulphur—1 cwt. per acre—a year ago. The herbage on the top-dressed portion is now much improved, and the colour changed to a rich dark green, so much so that the effect can be seen clearly from a considerable distance. Moss, which was previously prevalent, has been eradicated.

In the rape experiments two rows received no manure of any kind, while the adjoining two rows received sulphur only, with the result that the latter are growing quite 50 per cent. more than the unmanured rows. This result is all the more remarkable from the fact that the field where the experiments are in being is perhaps one of the poorest on the farm.

These experiments were inspected by a prominent New Zealand scientist, who expressed himself as "astonished at the result."

It is trusted, however, that no farmer who reads this article will run away with the idea that all he has to do is to apply sulphur and the result will be abundant crops. It is not the writer's intention to convey this impression, but the results of the few experiments carried out at this station and at similar stations in other parts of the world warrant further trials of this ingredient. It may not be a plant-food, but it creates in the soil an environment suitable for plant-life.

Sulphate of iron has also been applied to pasture land at this station with very marked results.

CONCLUSION.

It was my intention to deal with the results obtained from green-manuring and the growing of tap-rooted plants, but the article is already too long, and these subjects may well form the theme for other articles.

During November 14 acres of lucerne and 5 acres of grass were made into ensilage at the Moumahaki Experimental Farm.

In the experiments to determine the influence of manures on the feeding-value of pasture at the Ruakura Farm of Instruction the live-weight gains made in November on the basic-slag area were sufficient to pay for the cost of all manuring.

CALIFORNIAN THISTLE RUST.

A. H. COCKAYNE.

DURING the past five years the Californian thistle rust (*Puccinia suaveolens*) has been steadily spreading. At the present time it is more or less firmly established in nearly every locality where Californian thistle is abundant. So far it has had no appreciable effect, as only individual plants here and there have become affected, but there are indications that this fungus may probably prove valuable in the control of one of our worst weeds.

The fungus which causes the disease is one of the true rusts, and its attacks are restricted to Californian thistle (*Cnicus arvensis*) and cornflower (*Centaurea cyanus*). No other plants are subject to infection, so that there is no danger of this fungus becoming troublesome to any farm or garden crop.

The appearance of affected plants is very characteristic. The shoots develop earlier than normal ones, being light green in colour and often considerably thickened and hollow. The leaves are elongated and grow upright, the under-surfaces becoming covered with masses of chocolate spores which emit a very characteristic odour.

The mycelium of the fungus is perennial, wintering over from year to year in the underground stems, so that when once a plant becomes infected it remains in that condition permanently. Each year when the shoots are developed they become permeated with the mycelium, and this gives rise to the medosori in which the spores are developed. Winter spores are also produced, but these have not yet been recorded in New Zealand, it being probable that only one type of spore is produced here. The most notable feature of shoots produced from affected plants is that they *never flower;* in fact, they generally wither away before the normal period for flowering occurs.

As a general rule only isolated plants here and there in a patch become infected. Until this season comparatively little fresh infection of adjacent healthy plants has taken place. Many of the specimens received recently show that infection from diseased plants has been quite frequent. This is the most hopeful sign that the fungus may prove of value in checking the development of Californian thistle.

The rust is a native of Europe, and is now found in most countries to which the Californian thistle has been introduced.

E. B. Levy, photo.]

INFECTED PLANT AT SUITABLE STAGE FOR INOCULATION.

According to Pammell, it has killed out large quantities of Californian thistle in the eastern United States, being there looked upon as a valuable agent in the suppression of this weed. In Europe it is not looked upon as efficient in the killing-out of large patches, but as it prohibits the production of flowers it is regarded as decidedly useful.

ARTIFICIAL INFECTION.

The question that naturally arises is whether the present natural infection can be increased and hastened by artificial means. Massee has written, "As diseased plants do not produce seed by infecting sound plants, which is readily effected by lashing them with a diseased plant when damp, it should be possible to eradicate one of our worst weeds." In point of fact, however, I have found that it is exceedingly difficult to infect healthy plants when once the plants have attained any size and the leaves are at all hard. Infection seems to occur most readily when the leaves are young and during periods when there is a considerable amount of damp weather. In carrying out any infection experiments the farmer should direct his efforts towards spreading affected material amongst healthy patches *while the growth of the healthy plants is quite young*. If the foliage is at all mature the patch should be cut down and diseased material applied when the new growth develops. Where there is an abundance of diseased material available it is necessary merely to scatter it over the patch, taking care that diseased leaves are in actual contact with healthy plants. When the amount of diseased material is limited, small portions should be tied loosely to healthy plants. The work should always be done during damp weather. This is important, as the spores develop only in the presence of moisture. It is probable that the spraying of spores in water would prove even more successful than the spreading of affected material, but experiments in this direction are required before this method can be advocated.

Apart from the susceptibility of the thistle to infection when the growth is young, it is important to secure infection low down on the stem, so that the mycelium will not have to travel far to reach the underground stems. In this way the usual cutting that is necessary to prevent flowering can be undertaken without in any way spoiling the results of artificial infection. During the season in which inoculation takes place flowering will most likely occur, but when once the mycelium has reached the underground stems no more flowering will take place, and the weakening of the plant through the early withering of the affected shoots will finally result in its death.

Whether or not the thistle-rust will prove in any way an effective check to the spread of Californian thistle depends very largely on what success can be obtained by artificial infection. The farmer should use every endeavour to test thoroughly the method of spreading diseased material on to healthy patches. In most cases he will be able to procure diseased material locally, but if any difficulty be experienced in this direction the Department will be pleased to send small amounts of affected material to any one desirous of carrying out experiments.

BOTS.

THEIR NATURAL POWERS OF RESISTANCE.

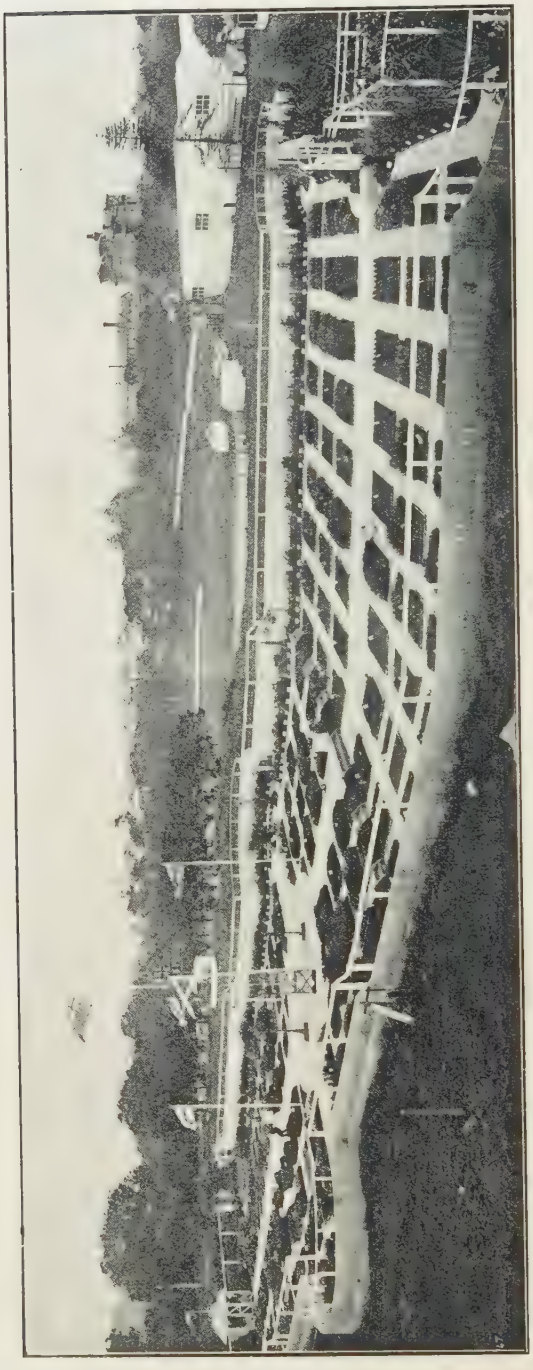
H. A. REID, F.R.C.V.S., D.V.H., F.R.S.E.

A SHORT time ago I received, through Mr. Hubbard, Inspector of Stock, Masterton, two specimens of bots taken from the nasal cavities of a sheep. These had been brought by a farmer to the local office of the Department for identification. They proved on examination to be larvæ of the sheep-fly (*Œstrus ovis*).

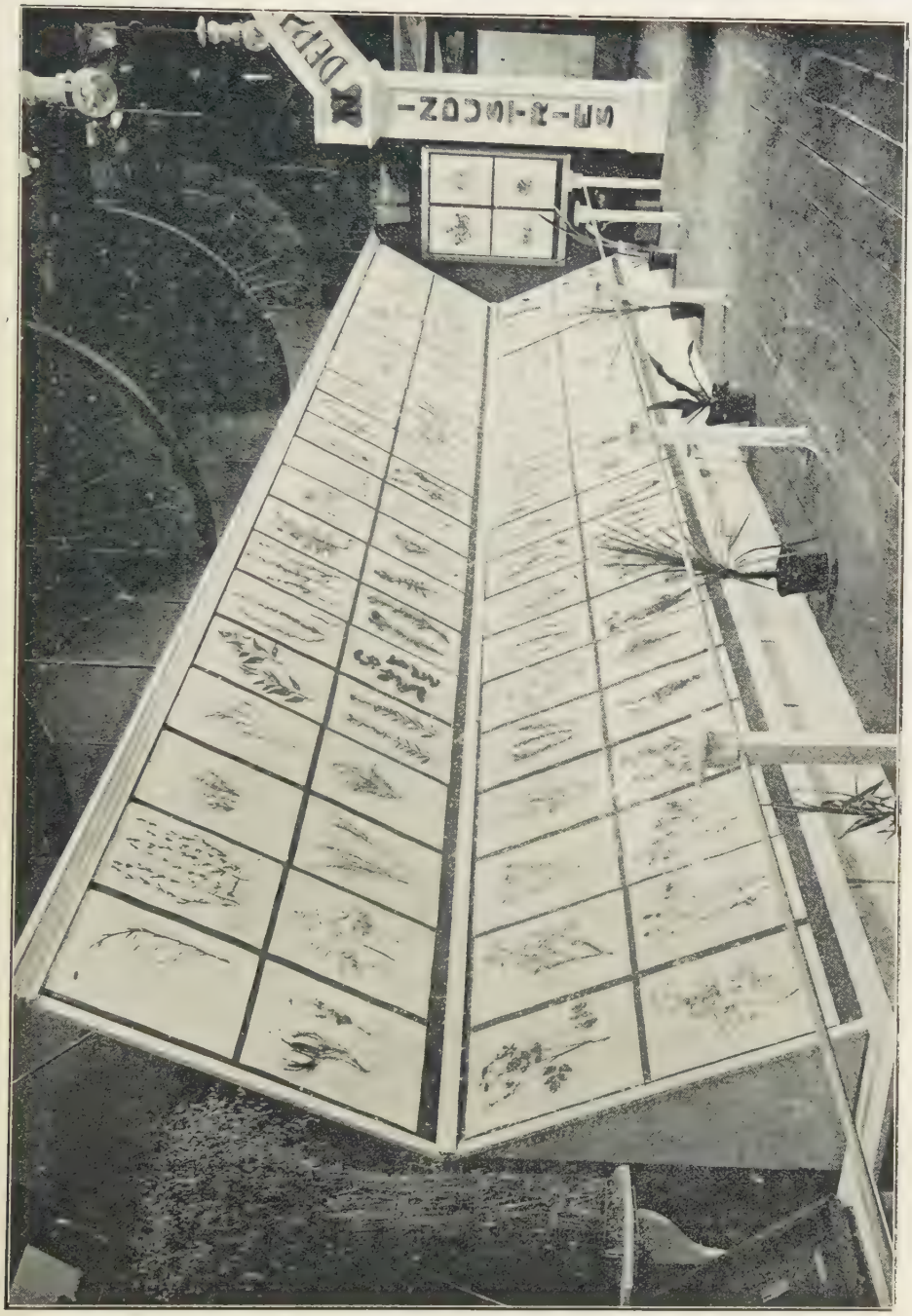
The parasites had been placed by Mr. Hubbard at about noon on the 22nd November in a glass-stoppered bottle containing 2-per-cent. formalin solution. On receiving the bottle at the laboratory two days later I was surprised to find on removal from the solution that one of them was alive. On being held in the hand or exposed to sunlight on the laboratory bench it slowly extended itself, and then commenced to move quickly away. The remaining bot was dead.

In order to ascertain how long these creatures could support life in such an intolerable medium, I replaced the live bot in the formalin solution, removing it each day to see whether it showed any signs of life. The warmth of the hand or sunlight seemed to have a revivifying effect, for up till the 28th November, or the seventh day after complete immersion in the solution, it still remained alive.

The natural powers of resistance of such lowly forms are enormous and it may well be contended even in this case that the parasite finally succumbed from prolonged exposure in an unsuitable environment rather than to the poisonous effects of the formalin. This observation serves to illustrate how ineffectual is the administration of drugs designed to destroy these parasites during the life of their host, and should cause farmers to pause before employing any of the quack remedies which are advertised from time to time as cures for bots.



S. B. Taylor, photo.] THE DEPARTMENT'S DEMONSTRATION-PLOTS AT THE AUCKLAND EXHIBITION.



S. B. Taylor, photo.] THE WEEDS-DISPLAY IN THE DEPARTMENT'S COURT AT THE AUCKLAND EXHIBITION.

FRUIT-TREE PRUNING.

J. A. Campbell.

The subject of fruit-tree pruning is one on which there has been in the past, and will continue to be, many differences of opinion. At the same time many of these differences refer mainly to details rather than to the general principles of the work itself. Many useful articles have been written on this subject for the benefit of orchardists in general, and more particularly for the guidance of the inexperienced fruitgrower. In reference to the latter I am of opinion that many of these articles, although otherwise excellent, defeat to a certain extent their own ends by elaborating too much on intricate details to the detriment of the governing principles of pruning and shaping the tree, and also by working in a qualifying statement such as the following: "There can be no rule-of-thumb method laid down in reference to pruning; local conditions have always to be taken into consideration; each class of fruit-tree requires more or less special treatment; the different varieties have different habits, as each individual tree differs from its neighbour, &c.; therefore a thorough knowledge of the growth and fruiting habits of the various classes and varieties of trees, which can only be acquired after a careful study of the trees themselves, is essential."

Now, these remarks are all very well, but, after all, they have to do mainly with very obvious details, and their importance can better be estimated by the experienced fruitgrower rather than by the man of inexperience. Fancy a novice being faced with a proposition of this kind—having to acquire all this information before he can possibly hope to prune his trees satisfactorily! The whole thing is an unknown quantity to him, which he magnifies out of all proportion. Under the circumstances, is there any wonder that many in this position give the matter up in despair, and leave their trees entirely unpruned?

Whilst not underestimating the importance of considering local conditions and the advantage of the knowledge gained by long experience, and a thorough study of the habits of the various trees, &c., I am of the opinion that the lack of this should in nowise deter a man of ordinary intelligence from pruning and training his own trees, so long as he understands and puts into practice the

underlying principles of pruning. If he does this he will find that many of the details will right themselves, and his own common-sense and observation will soon overcome the remainder.

The guiding principles in the pruning and training of practically all deciduous fruit-trees are—

Strong and rampant growth is against fruitfulness. Hard winter pruning promotes strong growth. Hard winter pruning and strong growth are mainly required in shaping and building up a strong, sturdy young tree, also in invigorating a tree on the decline through years of heavy bearing or other causes.

Weakness invariably induces fruitfulness.

Summer pruning, root-pruning, ringing, &c., weakens the tree.

Very often when a tree reaches the fruit-bearing age it is growing strongly owing to the various heavy prunings it has received when being built up, and it becomes necessary to check it to bring about the proper fruit-bearing condition.

There are several means adopted temporarily to check this strong growth. One way is to do the main pruning in the summer, leaving only a small amount to be done in the winter, and by leaving the leaders unpruned for a season or two. This will have the effect of steadying the tree if the growth is not too strong. Another way is to reverse the order of pruning altogether by pruning entirely in the summer, judging the time when the flow of sap has eased off sufficiently so that the cut portions will not have recovered from the shock in time to push out new growths, but while there is still sufficient flowing to ripen up and to convert the remaining buds into fruit-buds.

Root-pruning is also practised to check growth by opening a trench a sufficient distance from the trunk of the tree, mainly to catch the feeding-roots, and cutting these away around one side of the tree. If necessary the other side can be done the following season.

Ringing: A spiral strip of bark about $\frac{1}{2}$ in. wide is removed from the trunk of the tree just before the sap ceases to flow.

Any of these means will check the growth of the tree, but unless the growth is very strong summer pruning is preferable, being quite as effective as, and less dangerous to the tree than, root-pruning or ringing.

Light and air are necessary for the development and maintenance of healthy fruit-buds and spurs. A tree crowded with wood and shaded by dense foliage in the summer always has a large number of half-bare limbs, starved spurs, and immature

fruiting-wood. Therefore, in training a tree always allow for a free admission of light and air to all parts of it.

Perpendicular growths grow stronger than those in a horizontal position. The natural habit of growth is upward, therefore a perpendicular branch is more favourably situated than a horizontal one and will grow stronger. This class of wood if growing strongly should be removed if not required for the formation of the tree.

Upper buds grow stronger than lower ones. Advantage can be taken of this when training the young tree.

One-third of the buds on the previous growth if left intact invariably remain dormant. Therefore, in pruning the leaders one-third at least of the growth should be cut away.

If the above points are borne in mind and intelligently applied to meet circumstances there should be no doubt about raising a good fruitful tree.

What is the correct form in which to train a fruit-tree? Many shapes are spoken of, such as the "vase," "wineglass," "goblet," "reversed open umbrella," &c. Many fruitgrowers advocate a wine-glass-shaped tree, and straightway begin to train a tree shaped like a funnel, the limbs of which, in a few years, bow down like a weeping-willow. Some form or another of an open-centred tree, however, is now generally accepted.

The form of tree that I favour is the "wine-glass"—a tree with a well-set broad base. This form of tree admits of more well-set main arms being secured well down in the tree—where they should be—without crowding than does the "vase" or any other more perpendicularly shaped tree. The sap flows more sluggishly through the main limbs at the outset owing to their more horizontal position. This, with the maximum amount of light and air, assists in maintaining a healthy supply of fruit-spurs low down in the tree, and in the case of the peach ensures a plentiful supply of fruiting-wood all along the main limbs.

Usually the most satisfactory tree to plant is a one-year-old frrom the bud. Whether it be a whip or one on which a head has been started in the nursery depends mainly on the height and shape of the head. If a whip, it should be cut off after planting to within 15 in. or 18 in. of the ground, leaving a stub of an inch or so above the upper bud. This bud should be pointing in a direction away from the prevailing wind. The stub and the pressure of the wind will assist in preventing the new growth from taking up a too central position. The lower buds grow at a greater angle from the base, and are in a better position for growing into the wind. The same applies to the headed tree, planted

so that the branches with the greatest spread are on the windward side of the tree.

For the first two or three years after planting the efforts of the pruner should be devoted entirely to shaping the tree by building up a strong broad framework. To do this strong growth must be encouraged by hard winter pruning, more particularly for the first couple of years. Every advantage should be taken of all suitable growths which will tend to broaden the base of the tree as early as possible.

Cut to an outside bud pointing in the direction the limb should take. When the growth is not too strong leave a stub of an inch or two above the bud; this will help to spread the new growth. But if, in the opinion of the pruner, the branch being pruned is sufficiently strong to start three buds, the stub will not give sufficient spread. In that case cut two buds above the one required to form the limb. The two upper buds will take the heavy flow of sap and will grow almost perpendicularly, the third one will grow as a lateral branch, taking up a more or less horizontal position. During December cut back or remove entirely the two strong growths, thus throwing the sap into the lower one, which will strengthen up and form just the limb required. I have to thank Mr. A. B. Mansfield, Orchard Instructor, of Timaru, for this idea, which, I find, works admirably in broadening the base of a young tree.

Do not be in too great a hurry to increase the number of main branches unless the growths made are quite suitable for the purpose. There will be plenty of time after a broad base has been formed to do this. Work, rather, with the idea that one branch in a proper position is better than any number which are not.

After a good broad base has been formed, and all the main limbs set, the tree should be allowed to take on a more upright position. This will equalize the weight the limbs will have to carry, also the winter pruning should be much lighter; but always bear in mind the stability of the leader and the development of the buds. All the main limbs should be started as low down in the tree as possible. If possible, these should all be placed by the time the tree is four years old. Afterwards, unless an injury occurs, allow no further subdivision of the leaders. Just how many leaders a tree should have depends to a great extent upon the spacing, and this depends on the broadness of the base. The soil in which the tree is growing has also to be considered. On good soil an apple or pear tree can have as many leaders as a due allowance for light and air will allow.

As previously stated, summer pruning has just the contrary effect to winter pruning, and, when judiciously carried out, materially assists in hastening fruit-production. There are two objects in summer pruning: one is to assist in shaping the young tree, and the other is to restrict the too rampant growth of many young trees when they have reached the fruit-bearing age, and for general fruit-production when necessary. The work of shaping the young tree consists mainly of the removal of all surplus and misplaced growths, and keeping the tree open, and an occasional stopping of the strong leaders when necessary to balance the tree. Advantage should be taken of all growths, suitably placed, that will assist in building up a tree of the desired shape. This removal of surplus growths prevents to a certain extent waste of energy on the part of the tree, because the sap thus diverted is utilized in strengthening the permanent parts of the tree. But this should not be overdone, as every branch removed checks the tree to a certain extent just at the time when strong growth is required. More especially is this the case if the cutting is left till late in the season, in which case the tree may not have recovered from the shock before the flow of sap ceases, and more harm than good will have resulted. The complete removal of such growths should be commenced as early as possible, and be completed by the end of December.

On the other hand, the object of summer pruning for fruit is to check the tree. It should therefore be carried out later in the season. This also includes the complete removal of all unnecessary wood growths, including those which start immediately below where the leader was cut at the winter pruning, leaving the one most favourably situated to form the leader.

Strong laterals should also be cut back. In the case of the apple and pear, cut to within four or five buds of the base, and leave the weaker laterals untouched, both in the summer and winter pruning, until they have borne fruit. This they will readily do, owing to the natural weakness of their position.

After the tree has been formed, almost entire pruning can be carried out with advantage for a year or two in connection with all naturally strong-growing trees, such as the apricot and many plums of the Japanese variety, and strong-growing apples and pears, &c.

The peach should be annually pruned in the summer, although a fair amount of winter pruning will also have to be done.

This summer work, in addition to the removal of all surplus wood growths, includes the shortening-back of all the weaker growths on which the fruit will be borne the following year. This should be done as soon as the fruit has been gathered. If not cut back in the summer the blossom-buds are very often formed well

out on the end of this growth, but if cut back in the summer they will form well in to the base. To do this shortening-in with as little trouble as possible, use a good heavy sharp pruning-knife in the form of a slasher, and slash off a few inches of the tips. By this means a fairly large tree can be gone over in a few minutes.

Trees that are inclined to gum, such as the cherry and apricot, should be pruned in early spring and in summer.

Without going into details, winter pruning, in reference to spur-bearing trees which have reached the fruit-bearing age, consists mainly of the removal of all unnecessary wood growths, strong laterals which have escaped the summer pruning, and the shortening-back of the weaker laterals which have borne fruit to a spur nearer the base, and shortening back the leader.

With regard to the peach, remove all weak and exhausted wood and such growths as bore fruit the previous year. Shorten back all bearing-wood if the blossom-buds are close to the base, and if furnished with leaf-buds shorten the leader, and also do a certain amount of cutting to the growths along the main arms to encourage vegetation there.

The foregoing remarks are intended to convey the principles of pruning without going too deeply into details, which would be confusing without illustrations—and these take time to collect.

MILDEW ON VINES.

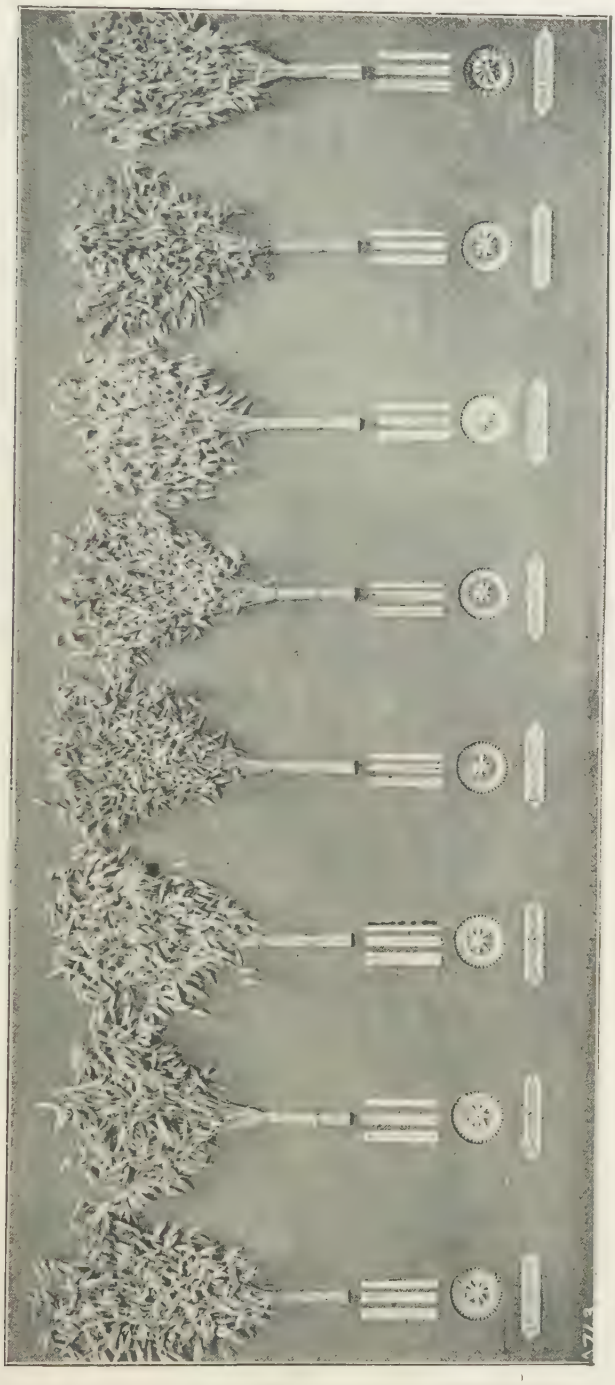
W. H. TAYLOR.

THE system of spraying sulphur on vines under glass for the cure of mildew, which I have found thoroughly effective after many years' experience, I have tried this season with equally good results on outdoor vines at the Arataki Experimental Farm. The secret of the system is to apply the sulphur in liquid form. The procedure for mixing is as follows: A handful of sulphur is thrown into a kerosene-tin, and then mixed with a little milk of just sufficient quantity to make a stiff paste, care being taken to remove all lumps. Of course, the milk should not be sour. Then fill the tin with tepid water, taking care that it is not too warm, as it would then have the effect of curdling the milk. Spray this in the usual way.

A plant affected with mildew received one application of this mixture, and after three weeks of wet weather the application was still effective, the material being well imbedded in the interstices of the leaf and stem systems.

S. B. Taylor, photo.]

THE GRAIN-SHEAF DISPLAY IN THE DEPARTMENT'S COURT AT THE AUCKLAND EXHIBITION.



A SECTION OF THE DEPARTMENT'S GRAIN-VARIETY EXHIBIT.

TESTING BUTTER FOR PRESERVATIVE.

W. E. GWILLIM.

BUTTER for the United States market is required to be free of preservative. As far as is known at present, all butter entering that country is subjected to a test for the detection of the presence of boron compounds, and when these are found to be present the importation of the butter is stopped.

The test described herein is the one in use in the United States. It is easy and inexpensive to operate, and, with suitable appliances conveniently arranged, can be performed in a few minutes. It is well worth using by buttermakers shipping to that market.

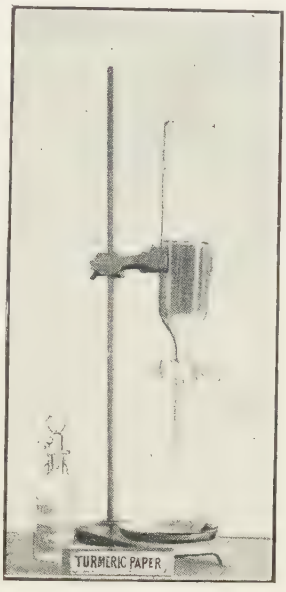
The use of chemical preservatives by our dairy-factory companies is far less common than is generally supposed, creamery men relying on cold storage and not on chemical compounds for the preservation of their butter. In many creameries no preservative is used, and in a number of others its use is only at the request of a small section of buyers for the British market, the amount employed in this connection being about one-half of 1 per cent. Creamery companies prohibit its use in milk and cream for manufacturing purposes, and there is reason to believe that this rule is closely observed. Possibly here and there a supplier may transgress on occasions, as, for instance, it might happen in the case of a supplier who, having been notified of a defect in the quality of his produce, and believing that the creamery man uses preservatives to correct defects, would use a little in his subsequent supply in the hope of its passing inspection without demur. Further, in creameries where butter is made both with and without preservatives, mistakes through carelessness may occur. Therefore, in view of these possibilities—although more or less remote—and the inconvenience and loss attendant on butter being rejected at its destination, it is advisable for buttermakers to test their butter for preservative before despatching it from the creamery. It is part of the buttermaker's business to ascertain whether or not his butter contains preservative.

Most commercial butter-preservative preparations consist usually of boron compounds in the form of boric acid or borax, or both, together with small quantities of bicarbonate of soda, sugar, saltpetre, and sometimes salt.

Whatever may be the value of the preserving properties of boron compounds, or whatever may be said in support of their use, there is abundant evidence in reports of experiments with regard to the use of the other substances to prove that they possess very little, if any, preserving properties. Their presence in the mixture is more to lower the cost of production than for any other purpose.

The other test described here is for detecting the presence of boron compounds in milk and in cream, and can be used for testing the raw material as received.

Both tests are qualitative—that is to say, they show the presence and not the quantity of the preservative. No weighing or very exact measurement of materials is required, and most of the appliances needed can be found amongst the glassware, &c., employed in other tests operated at creameries. Quantitative tests, or those which show the quantity, are outside the practical work of buttermakers, and there is no special call for their use.



THE TESTING-OUTFIT.

TEST FOR DETECTING BORON COMPOUNDS IN BUTTER.

The presence of boron compounds — borax, boric, and boracic acid—may be detected in butter by melting a small quantity of butter, separating the fat from the other constituents, adding to the latter a few drops of hydrochloric acid, and then applying turmeric paper. The paper will turn red or reddish pink upon drying if borates be present, and the test is confirmed if the paper turns olive-green upon being made alkaline with a weak solution of ammonia.

HOW TO OPERATE THE TEST.

1. Take about 60 to 80 grams of butter, or as much as will yield 5 to 10 c.c. (cubic centimeters) of the constituents other than fat; melt by placing in a half-pint-size milk-bottle, and stand same in a bath of water at near boiling-point.

2. When the butter is melted transfer to a glass "separating" funnel (of about 150 c.c. capacity and fitted with glass tap), and allow the butter-oil to collect on top of the watery solution.

3. Then draw off into a small china saucer or glass beaker about 5 c.c. of the watery solution.

4. To this add one or two drops of hydrochloric acid, and mix.

5. Then steep about two-thirds of a strip of turmeric paper (size about 3 in. by $\frac{3}{8}$ in.) in the mixture, and, when well moistened, draw against the edge of the saucer or beaker to remove curdy matter, if any.

6. Dry the paper without loss of time, and avoid scorching. It can be dried by being placed on a piece of blotting-paper and laid near a hot plate or steam-pipe.

7. Where a fair amount of boron compounds are present the whole of the paper which was moistened turns red or reddish pink. A trace of the preservative may be indicated by the same colour on the edges or in small patches on the surface of the paper. The exact tone of colour obtained depends largely on the quality of the paper used. No change in colour occurs where boron compounds are not present.

SOME NOTES REGARDING THE TEST.

The Separating-funnel.—In the absence of this, the watery solution from the melted sample can be obtained direct from the bottle in which the butter was dissolved, by cooling and solidifying the fat, and then piercing it with a glass rod and withdrawing some of the solution with a pipette.

Hydrochloric Acid.—This should be "chemically pure." About 1 oz. is enough to procure at a time, and the first supply can be obtained in a 30 c.c. dropper bottle.

Turmeric Paper.—This is sometimes referred to by American writers as "tumeric" paper. Some brands are more sensitive and readily absorbent than others. Merck's first quality, termed "Curcuma paper, Ph.G.V.," is recommended.

Traces of Preservative.—The determination of what constitutes a trace of preservative may prove a little hard to a beginner, and carrying out the following experiment may be helpful in removing doubt. Take 18 c.c. of pure water—rain or condensed steam—and add to it half a gram of a mixture of borax and boric acid, or commercial butter-preservative. Divide the solution into halves, and test one half. Next take the other half and add 9 c.c. of water; divide this and test. Then continue dividing and testing and note the coloration obtained at each test. The size and depth of colour shown on the paper becomes less as the solution is weakened. After about the twelfth test all traces of red colour may disappear.

Interest is added to this experiment if more than one make of turmeric paper be used with each test.

Uniform Results.—Try to use similar temperatures and quantities of materials whenever testing. Uniform methods make for uniform results.

Salt.—This test may be applied to salt by making a sample of salt into a brine. It would be very exceptional to find boron compounds in salt.

Soda.—Turmeric paper may be applied to a solution of soda and a reddish brown colour obtained. This colouration will not respond to the confirmatory test for boron compounds.

Ammonia-solution.—The confirmatory test is not much practised. A weak solution of ammonia can be made by mixing a few drops of ammonia with about 20 c.c. of water.

TEST FOR BORON COMPOUNDS IN MILK OR CREAM.

Take a 9 c.c. sample of milk or cream and neutralize the acid by the "alkaline test" in general use in dairy factories. Next fill the pipette with a mixture made of equal parts of glycerine and water. Add this drop by drop to the sample neutralized and at the same time shake it, to mix in. If borax or boric acid is present the colour changes from pink to white. No change in colour occurs when boron compounds are not present. In operating this test it is advisable to have a control sample known to be pure in order to compare results.

IMPORTANT TO BUTTERMAKERS.

Whenever a churning of preservatized butter is to be followed by one which is to be free of preservative the churn should be washed out clean before the cream is admitted; also all appliances used for handling salt, as salt-table, sieve, box, scale, &c., which have previously been brought in contact with any mixture of preservative and salt should be quite clean before use. Neglect of these precautions has resulted in butter containing traces of preservative.

The Vermont Experimental Station, United States, conducted an experiment with fifty-eight cows in order to test the Guenon escutcheon theory. The escutcheons of all the cows were carefully examined, and their size and shape compared with the milk-yield. After a careful study of the whole matter it was concluded that the escutcheon has practically nothing to do with the milk-flow.

SEMI-OFFICIAL TESTING.

W. M. SINGLETON.

THE first year's work in connection with the testing of the yields of purebred dairy cows has now been completed, and many of the productions have already been placed before the readers of the *Journal*. Breeders have recognized that this system of testing affords a good means of bringing the merits of their cattle before our dairymen. The response which they have made to the suggestion that the Department should co-operate in authenticating yearly records has been generous. Each year this movement is sure to be more appreciated, and it will ere long be recognized as one of the paramount necessities of the dairy industry; indeed, in some quarters this is now the case. Breeders are experiencing a greater demand for young bulls with a butter-fat record backing, and this in itself is evidence of an improved spirit in modern dairying.

With a year's experience of the system of testing which was adopted, it appears that the line of work decided upon has given very general satisfaction. The figures have been safeguarded as much as possible with a view toward making the records worthy of confidence, and the rules governing the test indicate a line of action which must appeal to practical dairymen. The safeguards which have been taken to ensure regular breeding while records are being made is one of the greatest factors in keeping this work on a practical basis from the average dairyman's view-point. Some of the world's largest records have been made by cows which have been required to drop a calf neither for the season before test nor for the season after the test. While such records are interesting, they are not of the same practical value as those made under New Zealand rules.

It appears that subsequent experience has evidenced the wisdom of adhering to records for a full lactation period, not exceeding 365 days. Some breeders would have preferred the Division to undertake the work of making official weekly tests, but a strong stand was taken against this from the inception of the semi-official testing work. Some figures from a number of the American records selected by two students of the University of Wisconsin are relevant in this connection.

MAMY I.

Thirteen-year-old cow which headed the mature Jerseys. Milk 9,710 lb., fat 514·12 lb., in 359 consecutive days. Owned by E. Griffiths, New Plymouth.

DUTCH GIRL.

Which headed three-year-old Holsteins. Milk 18,296·5 lb., fat 643·29 lb., in 362 consecutive days. Owned by G. Aitchison, Kaitangata.

SEVEN-DAY AND YEARLY TESTS.

In the following table are given the lowest and highest yearly records of each class, also the amount of fat each animal produced in seven days:—

Class.	Rank in Yearly Test.	Yearly Record.		Seven-day Record.	
		Milk.	Fat.	Milk.	Fat.
		lb.	lb.	lb.	lb.
I ..	Lowest ..	7,570·4	269·0	244·0	8·0
	Highest ..	15,155·2	475·8	256·3	8·7
II ..	Lowest ..	9,404·8	310·5	290·0	10·8
	Highest ..	18,134·0	633·6	315·9	11·2
III ..	Lowest ..	8,633·2	293·9	390·6	13·7
	Highest ..	20,108·2	658·2	390·8	12·3
IV ..	Lowest ..	8,195·4	262·9	346·4	15·9
	Highest ..	21,611·7	728·0	474·1	14·6
V ..	Lowest ..	7,053·9	251·4	403·4	16·5
	Highest ..	21,628·4	757·0	418·4	17·3
VI ..	Lowest ..	9,262·8	309·0	541·0	18·6
	Highest ..	26,861·5	740·5	443·0	18·2
VII ..	Lowest ..	8,853·6	328·4	544·8	20·1
	Highest ..	24,820·2	740·5	645·1	20·9
VIII ..	Lowest ..	12,878·6	416·6	496·5	22·5
	Highest ..	20,174·6	724·8	545·1	22·1
IX ..	Lowest ..	13,012·7	463·5	442·6	24·4
	Highest ..	26,192·7	872·7	745·4	24·7
X ..	Lowest ..	17,050·4	642·9	646·1	29·8
	Highest ..	27,432·5	998·3	651·7	28·2

Such outstanding disparity of figures as is indicated by Classes III, IV, and VI will be exceptionally interesting, since in each of these instances the poorer cow for the week gave more than twice her competitor's butter-fat during the season. While all these pairs indicate that weekly records may be valued too highly, the same point is also emphasized when we aggregate the yields. During the season the ten best cows produced 7,329·4 lb. fat and the ten poorer cows produced 3,548·1 lb. fat—not one-half that of the better ten. Despite this fact, those ten cows which, reckoned on the basis of their yearly yields, were the poorer ten actually produced more than their competitors for the week—the exact figures being 180·3 lb. fat as against 178·2 lb. fat. Were a purchaser buying these cows on records of production he would, if basing a judgment on the weekly records, pay more money for the ten cows which would not yield in a lactation season one-half the butter-fat of the other ten.

QUEEN MAJORIE II.

Which headed the four-year-old Jerseys. Milk 7,649 lb., fat 430·71 lb., in 349 consecutive days. Owned by A. and J. O'Donnell, Inalla.

It may, of course, be suggested that some of these lactation periods for the poorer cows for that year were not normal. We have, however, seen so many records of cows even in New Zealand which bear out the same idea as these figures suggest that we feel these figures are likely to convey to New Zealand breeders and dairymen the inadequacy of weekly records as an indication of a cow's productive capacity. It will be obvious that the Department was well advised in declining to co-operate with breeders in connection with weekly tests.

During the period under review fifty-three Holsteins and sixty-one Jerseys have received certificates. A further number have been under test but have not yet qualified regarding subsequent calving. Some twenty-one Holsteins and twelve Jerseys have attained the necessary standard of butter-fat production, but failed to qualify as regular breeders. In a number of cases the failures were due, doubtless, to the owners' eagerness to get large records, this having induced rather much delay in breeding. The number of cows which have qualified in all respects, together with those which have filled the requirement for fat only, is seventy-four Holsteins and seventy-three Jerseys.

For the first season's testing many breeders found themselves unprepared. Had the case been otherwise a larger number of cows would have qualified. Of 255 cows entered, 244 were tested, and of these 113 have fully qualified. A number of the cows entered commenced their test at an unfavourable period of the year, some commencing even in January. It is obvious that records made under such circumstances do not do the cows justice. It is expected that as breeders gain more experience a larger percentage of the cows entered will produce yields which will entitle them to certificates.

Breeders participating in the test have, almost without exception, co-operated splendidly with the Division. The weights returned have been such as to warrant every confidence in this line of work. It is felt that breeders have entered into the spirit of the work, and while each is anxious to have his cow make a good record, the standard of honesty has been high, and we can commend the records made as worthy of every confidence.

Practically all the records made have already been published, but a few are to follow. These figures bear strong testimony to the fact that in New Zealand we have some splendid strains of purebred dairy stock. The maximum record was made by Mr. J. C. N. Grigg's Holstein-Friesian cow Netherland Queen VII, with a production of 659·31 lb. of butter-fat. The best Holstein in the four-year-old class is Mr. Newton King's Countess Galatea, with a

BELVEDERE ROSE.

Which headed three-year-old Jersey class. Milk 8,598·5 lb., fat 451·68 lb., in 294 consecutive days. Owned by R. J. Linn, Normanby.

yield of 434·58 lb. fat; while Mr. George Aitchison's Dutch Girl heads the three-year-old class with 643·29 lb. fat, and Mr. John Donald's Netherland Princess IV leads the two-year-olds with 430·82 lb. fat.

The Jerseys have certainly placed some fine yields on record, and these are headed in the mature class by Mamy I, owned by Mr. E. Griffiths, of New Plymouth. This record stands at 514·12 lb. of butter-fat. This cow was in her thirteenth year on starting test, and in her fourteenth year during most of the lactation period. In the four-year-old class pride of place is held by Messrs. A. and J. O'Donnell's Queen Marjorie II, with 430·71 lb. fat, and Mr. R. J. Linn's Belvedere Rose heads the list of three-year-olds with 451·68 lb. fat. Good as are the foregoing Jersey records, the laurels must go to Mr. F. E. Hellyer's two-year-old heifer Lady of Collingwood, which not only heads her class but leads all the Jersey classes, with 524·29 lb. fat.

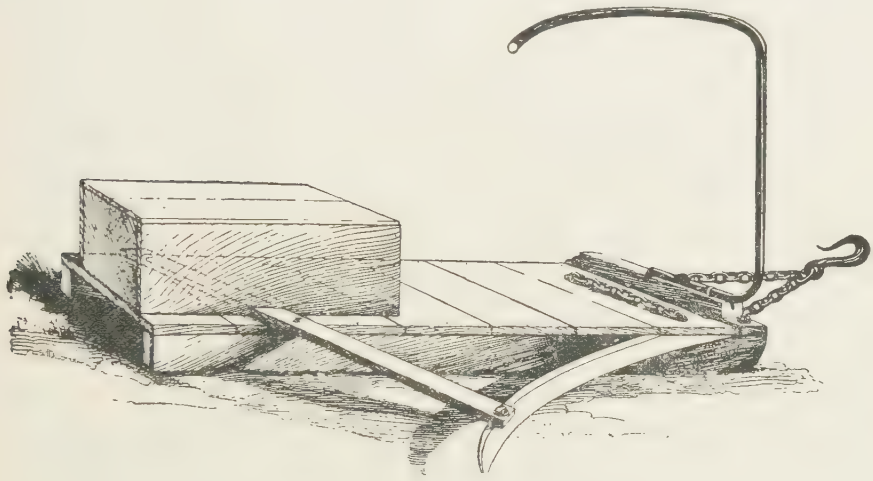
Some of these splendid records, and more especially those in the younger stock, show that there are great potentialities in our dairy breeds from the view-point of record-making. We could refer to splendid performances by other cows which have been under test did space permit, but the foregoing is sufficient to show our dairymen that we have good stud stock in New Zealand, and it is hoped that the publication of records of these yearly productions will stimulate a desire on the part of our average dairymen to head their herds with bulls from these proven strains.

I do not entertain for a second the thought that we have approximated the limit of our output from the soil. As a matter of fact, we have just begun to attack the problem. We have not even reached the end of the pioneering stage, and have only in a very few localities developed conditions where maximum returns may be secured. But we have unmistakably reached the period where we must think, and plan, and work. We can no longer rely on the bounty of nature.—*D. F. Houston, Secretary of Agriculture, U.S.A.*

Two of the leading dairy-cattle breeds of Sweden are the imported East Friesian and Ayrshire. Indigenous breeds have almost entirely disappeared. In Central Sweden there were a number of herds chosen from the native red or yellow cattle and containing a good deal of Dutch, Shorthorn, and Ayrshire blood. These combined a good milk-yield with considerable weight and early maturity. Owners of the herds united to form a uniform breed. They used imported animals, and their efforts have been so successful that the race evolved, the Red Spotted Swedish, has now been recognized as a pure breed. They are most like Ayrshires, but are said to be better producers of butter-fat.

A SIMPLE MAIZE-CUTTER.

It is necessary to have a quick means of cutting maize, and the following illustration shows a very simple device which can be made by any handy man. It consists of a sledge 3 ft. 6 in. long and 20 in. wide. The runners are made of 3 in. x 2 in. or 4 in. x 2 in. hardwood, and are held together by a floor of stout boards. A scythe-blade and



iron guide is attached to the sledge, as depicted. A steady horse should be harnessed to the sledge, which is driven between the rows of maize. The driver sits on a box on the sledge, and, driving with one hand, he guides the fall of the maize stalks with the other.—*The Stockowners' Guide.*

One-eighth science, three-eighths art, or knowing how to do the thing, and one-half pure business make up the work of farming.—*Official Bulletin of the International Dry-farming Congress.*

In consequence of prolonged drought in most of the maize-producing States of America, the outlook for the maize crop is a very poor one, a subject for regret by purchasers of that grain in this country, and a very serious disadvantage to American stock-feeders. The *Cincinatti Price Current* estimates the total yield of maize at about 2,250,000,000 bushels, as compared with last year's official estimate of 3,124,746,000 bushels.—*Live-stock Journal.*

AGRICULTURE ABROAD.

THE WORLD'S WHEAT AND MEAT PRODUCTION.

THE Tenth International Congress of Agriculture, which was held during the course of the recent Ghent Exhibition, was one of the most important gatherings yet held in connection with the agricultural industry. Great Britain was officially represented at the Congress by Sir Sydney Olivier, K.C.M.G., Sir James Wilson, K.C.S.I., Mr. T. H. Middleton, C.B., and Mr. A. B. Bruce, of the Board of Agriculture and Fisheries, Mr. R. B. Greig, of the Scottish Board of Agriculture, and Mr. M. G. Fletcher, of the Department of Agriculture and Technical Instruction for Ireland. Sir George Fordham was Chairman of the British Committee.

The President of the International Commission of Agriculture, M. Méline, formerly Prime Minister of France, presided. In officially opening the congress M. Méline made a notable speech, in the course of which he said,—

I wish, as my contribution to your labours, to bring before you to-day one single conclusion which appears to me of such a nature as to give us confidence in the future of the agricultural industry. This conclusion is reached by a close analysis of the general movement of production in the world as regards those two great necessities of life, corn and meat.

This work of analysis has for a long time been rendered impossible by the insufficiency and the lack of uniformity in the statistical records. Each country having different weights and measures, comparisons were difficult, and the general progress of production was obscure.

The International Agricultural Institute at Rome recently threw some light on this question by publishing complete information on the production of wheat in various countries for the last ten years, and for this we are much indebted to the Institute. The French Ministry of Agriculture has done more, for, with great labour, it has issued a comparative statement of the production of wheat in various countries for the last thirty years, converting all the foreign measures into the metric system.

I will not touch upon those details of this statement which interest France except in respect of one important point. The statement in question shows that the production of wheat in France during the past thirty years has increased by 16,000,000 hectolitres, although the area cultivated has remained almost stationary, the increase being the result of an improved yield *per hectare*, or, in other words, the result of perseverance on the part of French agriculturists, and an advance in their cultural methods.

I come now to the world-production of wheat. I say "world-production," because the statement in question contains the analysis of the production not only of wheat in Europe and America, but in Asia (including India and Japan), Africa, and Oceania. It shows that the total area under wheat in all these countries,

which was 70,000,000 hectares from 1881 to 1890, rose to 95,000,000 in 1901 to 1910, during which period the production also rose from 624,000,000 to 880,000,000 quintals. Thus the area cultivated has increased by practically 36 per cent. and the yield by 41 per cent., the improvement in the yield being general. In this respect America shows an increase of 55 per cent., Europe 32 per cent., and Asia only 6 per cent.

But in order to be satisfied as to the future of the world's supply of bread, it is not sufficient to show that the yield of wheat continues to increase. It is necessary to consider two other important factors. One of these, the increase in the population—that is to say, in the number of consumers—may be estimated fairly accurately. The other factor is the growing requirements of consumption, which all over the world tend to concentrate more and more on bread, and especially bread of good quality. The extent of this factor is unknown, but it is increasingly active. When, however, one examines the first-mentioned factor, one finds that in Europe the population increases much more rapidly than the production ; if, for instance, the latter is compared with the number of inhabitants at different periods, one finds that the average production of wheat in Europe has fallen in thirty years from 126 kilogr. to 117 kilogr. per head.

Europe is, therefore, to-day deficient in its production of wheat despite the considerable yields of the rich granary of Russia, and it is to the great wheat-producing countries of America that we are more and more obliged to turn for the supplies necessary for our consumption ; but on this side also the horzion is darkening, and it is already possible to foresee that in the near future the yield of the New World will no longer increase with the increased consumption. The United States, which was half a century ago the great wheat reservoir of the world, a reservoir which was believed to be inexhaustible, sees each year its reserves absorbed by the mounting tide of new consumers.

Up to 1900 the cultivation of wheat, it is true, considerably increased, for the area sown had grown from 14,000,000 to 20,000,000 hectares ; but since that year this upward movement has been arrested and the yield has ceased to increase, whilst the number of mouths to be fed has grown from 63,000,000 to 92,000,000. The result of this is naturally a decrease in the surplus of the United States wheat available for exportation ; these exports were on an average up to 1903 some 72,000,000 hectolitres, whereas to-day they stand at scarcely 20,000,000 or 25,000,000. One can therefore foresee that, as the result of a really bad harvest, the United States would, in their turn, become importers of wheat.

It is true that, side by side with the United States, there is growing up a powerful people with immense agricultural territories at their disposal, which are in full development and which at first sight would seem able to take the place of the States in the production of wheat. I refer to Canada, the three great western provinces of which alone produce more than 40,000,000 hectolitres of wheat, and which exported in 1910 18,000,000 hectolitres of grain and 5,000,000 hectolitres of flour. But here, again, one already begins to see the probability of a falling-off in the future ; the rapid growth of the population in Canada threatens, as in the United States, to absorb sooner or later all the surplus of the harvest they are able to produce. During the last ten years the population of Canada has grown by nearly 2,000,000, and immigration is constantly increasing. In 1910 the number of persons that emigrated to Canada amounted to 303,000, of whom 124,000 came from the United States.

You see, therefore, the great wheat markets outside Europe, which for a long time have been considered to provide an inexhaustible reserve, tending more and more to harden, and to be reduced to supplying the needs of their increasing populations, who are attracted by the richness of the soil and the facilities for making a profit out of their labours.

No doubt there remain other sources in process of development, such as Argentina and Australia, from which countries exports are already large, but even these will not suffice to make up for the decrease from the United States.

From this brief and suggestive analysis of the present world-production of wheat I consider that we are justified in coming to the conclusion that we have now arrived at a time when the desertion of the rural areas tends perceptibly to reduce, especially during the last ten years, the production of the supply necessary for the sustenance of mankind as regards the first and most important article of general consumption, wheat.

If we now pass from wheat to that other article of food, meat, of which the consumption per head of the population also increases in proportion to the improvement in the condition of life, we find an even less happy state of affairs; because one cannot increase a herd at will as one can increase the acreage grown with corn. Here again the great exporting countries outside Europe appear to be reducing the quantity of live-stock just at the time when the demands of their own increasing populations require a larger quantity of meat-supplies.

In Canada the quantity of cattle, sheep, and even pigs continues to diminish, so that the number of horned stock exported has fallen by 80,000 and of sheep by more than 400,000. I might add, in passing, that while Canada used to export some 12,000,000 poultry, it now exports none; it no longer exports eggs, but it is obliged to import them, although formerly it exported 11,000,000 dozens.

In the United States we find the same condition of things; for a long time a marked reduction has been apparent in the production of live-stock. The results of the last census show that from 1900 to 1910 all branches of live-stock breeding have diminished, whilst the population has been increasing during the whole period. The falling-off has been 4 per cent. in the case of cattle, 9 per cent. in the case of sheep, and 4 per cent. in respect of pigs. It is clear, therefore, that unless the breeding of live-stock in that country again develops, the United States will soon have to make great sacrifices to feed its immense population.

I must ask you to forgive me for quoting so many dry and indigestible figures, but I desire, before this great meeting of representatives of the world's agriculture, to put my finger on an economic fact of the highest importance, because it is one which should open the eyes of every one to the necessity for taking precautionary measures.

Happy are those countries which have sufficient to supply the needs of their population. They are able to remain tranquil as to their future so long as they maintain their agriculture. As for the other countries, they will be well advised not to wait until they are affected by a general shortage of food. They will, of course, not die of hunger, but they will have to pay exorbitant prices for their bread and their meat, and will be obliged to search the world for their supplies.

Thus, after a long and tedious digression, for which I again apologize, I return naturally to my original starting-point, the question of the depopulation of the countryside, which tends to become a general characteristic. All countries are interested in meeting this difficulty and in bringing back capital and labour to the soil, if they do not wish to suffer cruelly from their culpable indifference to the situation. Those who, in their improvidence, have allowed the evil to grow will be bound to pay a tribute of increasing weight to those privileged countries which will become the masters of the economic position as regards exportation.

Civilized man can deny himself many things, but he is unable to get on without food, and the more he is civilized the more exacting he is as to his nourishment, and he will therefore make every sort of sacrifice in order to continue the manner of existence to which he has become accustomed. In this way, through the force of circumstances, if other means fail, the return to the land will be brought about by natural causes. The desire for gain will bring back the workers to the soil, just as it has led them to the factories. Agricultural workers must be paid such wages as are necessary to retain their services, and farmers, like other employers, will add this increase in the cost of production to the price charged for the produce. In this way the proper balance, which has been broken for so long to the detriment of agriculture, will be re-established to its advantage.

But you may say, "If these things happen living will become more and more dear, and already to-day times are hard enough." Complaints are general, and every one asks himself to-day how things will be to-morrow. I do not dream of denying it, and I regret as much as any one the hardness of modern existence. It is in order to make that existence easier and to put a limit to the present state of things that I utter this warning and never cease to draw attention to the unfortunate consequences of the desertion of the countryside.

I draw attention to them in the hope that the evil itself may be productive of the remedy. I know indeed of only one means, but it is a decisive means, of checking the rise in price of food, and that is by continuously increasing production, the comparative scarceness of foodstuffs in the world being the main cause of their high prices.

One must bring back to the land some part of the unthinking crowds which pour into the great towns, crowds which the State seems to wish to draw into and retain in these centres. In order to counterbalance the attractions of town life we must give agricultural labourers houses as comfortable as those built for town workers. We must endeavour to turn them into small owners in order to bind them to the soil. Life in the village must be made more agreeable, and middle-class landowners must set a good example by not disdaining to cultivate their own land. The education given to women should create in them a love and pride in the agricultural profession. The agriculturist should be regarded as a public benefactor, and education, art, and literature should be the advocates of a rural life. So will the balance between agriculture and other industries, between the country and the town, be re-established, and we shall once more enjoy the benefits of cheap living.—*Journal of the British Board of Agriculture.*

APPLES AND ALFALFA (LUCERNE).

MR. ALVA ADAMS, Chairman of the Panama Exposition Commission which recently visited New Zealand, is a keen student of agricultural affairs. He delivered a characteristic address before the National Farm Land Congress in Chicago, selecting the above title as a text from which to preach a sermon upon rural life. The following extracts furnish a fair idea of this striking "back to the land" appeal:—

"Back to the land" means independence and self-respect for the individual and safety to the nation. Every idle jobless man who shuffles along a city street becomes a menace to free government and a liability to the community. Every home-builder, every man who by honest toil provides for his family, is a positive asset, a true ashler in the fabric of the Republic, for of such is the kingdom of liberty. . . .

The prototype of the clover-fields that wintered the flocks and herds of Abraham are seen in the lucerne-fields of Colorado and other States. They are not alone material assets, but upon the landscape they are spots of beauty. Their vivid colours when viewed from our hills seem like brilliant emeralds upon the breast of the desert. These crops are permanent in the ledger of man's resources. Commerce may fade and fleets may sink, empires and cities may become one with Nineveh and Tyre, but the apple and the lucerne of an irrigated field will bear its fruit and fodder as long as the sun shines, water runs, and man works. Around the broken granite gods of forgotten religions the Egyptian peasant of the twentieth century guides his wooden plough and gathers harvests from the fields the Pharaoh tilled. Religions may disappear, learning may be forgotten, the palaces that Cæsar builds will crumble, anarchy may upset courts, laws, institutions; but the irrigated land—it abideth for ever. . . .

No administration will ever need to apologize for money spent to reclaim waste lands to make them fit for homes. There is no policy of national defence so certain as that which encourages ownership in our soil. Every American citizen who is planted upon a productive acre of land becomes an additional rivet in the armour of national security. It would be a reckless power that would assail a nation of home-owners. In Colorado the Government has just completed the Gunnison Tunnel, making as fertile as the Nile Valley a domain of arid land for four thousand modest farms. The cost has been 3,500,000 dollars. One battleship costs as much as three Gunnison Tunnels, without considering that the one is a constant and tremendous liability, while the other is a growing and perpetual asset and dividend-payer. Which is the better investment? Apple-orchards and lucerne-fields are better nurseries for citizenship than decks of ships or military camps. Free government has no ally so strong, so sure, as the home-owner. Land and liberty are closely allied. A title-deed to an acre of land is a guarantee of patriotism. Property-owners always desire better government. Anarchy makes no recruits among taxpayers. Insurrection never received shelter, sympathy, or contribution from the owner of an apple-orchard or a lucerne-field. Even

socialism stands abashed and impotent in the presence of a self-reliant, independent owner of a debt-free piece of productive land.

The armies and fleets of Japan are not half the menace to our Republic as are the unemployed and propertyless of the country. Idleness and poverty are the breeding-ground of riot and revolt. Turmoil and lawlessness bring no harm to those who have nothing. Those who have to pay the cost of disturbance and upheaval, the land and home owner, are the bulwark of stability and safety. Stockholders make the best guardians of property and institutions. Self-interest is the most reliable thing in the world. The home-owner becomes a soldier of defence, enlisted for life. . . . .

To illustrate the closeness of happiness, security, and prosperity to the soil, no crop will illustrate better than lucerne and apples. These are but two out of a hundred golden products of rural life, but they represent small farms, intense cultivation, and certain success. They stand for well-cultivated lands, for closely settled communities, for convenient schools, churches, and markets, for telephones, free delivery, and for homes blessed with all the conveniences. The 20- or 40-acre apple or lucerne farm may not admit of a summer home or a yacht upon the sea, but it will be free from the temptation, dangers, and heart and soul wrecks that so often invade the perfumed white way of luxury. Bonanza mines, commerce, and speculation sometimes win larger prizes, but the risk and hazard are greater. Ninety-five per cent. of those in the marts of trade fail. Of the sons of industry who follow the plough ninety-five per cent. succeed: their earnings may not be large, but every dollar is bright with the smile of honest toil, and upon them rests the benediction of Almighty God.

Apples and lucerne are permanent and abiding. Gold exhausts—it has but one crop; it plants no seed. Civilization depends upon reproduction, therefore gold cannot be its prophet and saviour. The gold that Solomon mined litters the bottom of the seas, the very mines from which it came are lost; but the seed of the apple that played its part in the drama of Eden finds its progeny in the bud and blossom and fruit that glorify the orchards of the twentieth century. For two hundred generations the apple has blessed the race, almost making amends for being the cause of man's expulsion from Eden. Lucerne goes back to the infancy of the world. God made it on the third day of creation. It has ever been good for man and beast. It was lucerne salad upon which Nebuchadnezzar fed; his foraging in the fields with the brutes was physical and moral tonic, for the Bible says that, after seven years of browsing in the lucerne pastures, he became a greater king, with the glory of his kingdom and his honour and brightness restored.

Lucerne is not a transient grass; its roots may not take hold on the centre of specific gravity, but they do have a keener sense for hidden water than the magic water-finding hazel rod of my boyhood. . . . .

The benefits that will come to the American farmer from studies of lucerne only are worth more than the cost of all the agricultural colleges in the land. It is a delusion to think that science is not practical, that it will not pay. Those who experiment the most, who study the most, reap the most dollars. . . .

Knowledge is power everywhere. The farmer who does not take advantage of the investigations and experiments of State and nation is stupid. He is throwing away diamonds and gold; he is not a farmer, he is a fool. It is the Burbanks and not the kings of Wall Street who are the benefactors. Those who develop a new or improve an old variety of fruit, food, or fodder are greater than those who rule in the capitol, who by manipulation and combination gather billions of tainted dollars. . . . You cannot be a successful farmer and be a loafer any more than you can be a horticulturist and not know the difference between a Ben Davis and a Jonathan apple, or be a zoologist and not know the difference between a lizard and a wizard. Knowledge and work are fundamental. . . .

The promotion of lucerne is a matter of national concern. It spreads the domain of possible homes. It builds houses of comfort and great barns. It raises the grade of the cow, the sheep, and the pig. It is the crop that never fails, it never wants for a market. The home stock-pens make an ever-pressing and profitable demand upon the supply. The farmer who consumes the product of his meadow has found the sure road to prosperity. Lucerne lends itself to this home use. It is the "Fortuna's purse" of modern agriculture. It pays debts, lifts mortgages; it sends Sam to college and Mary to the normal school. It helps mother in a

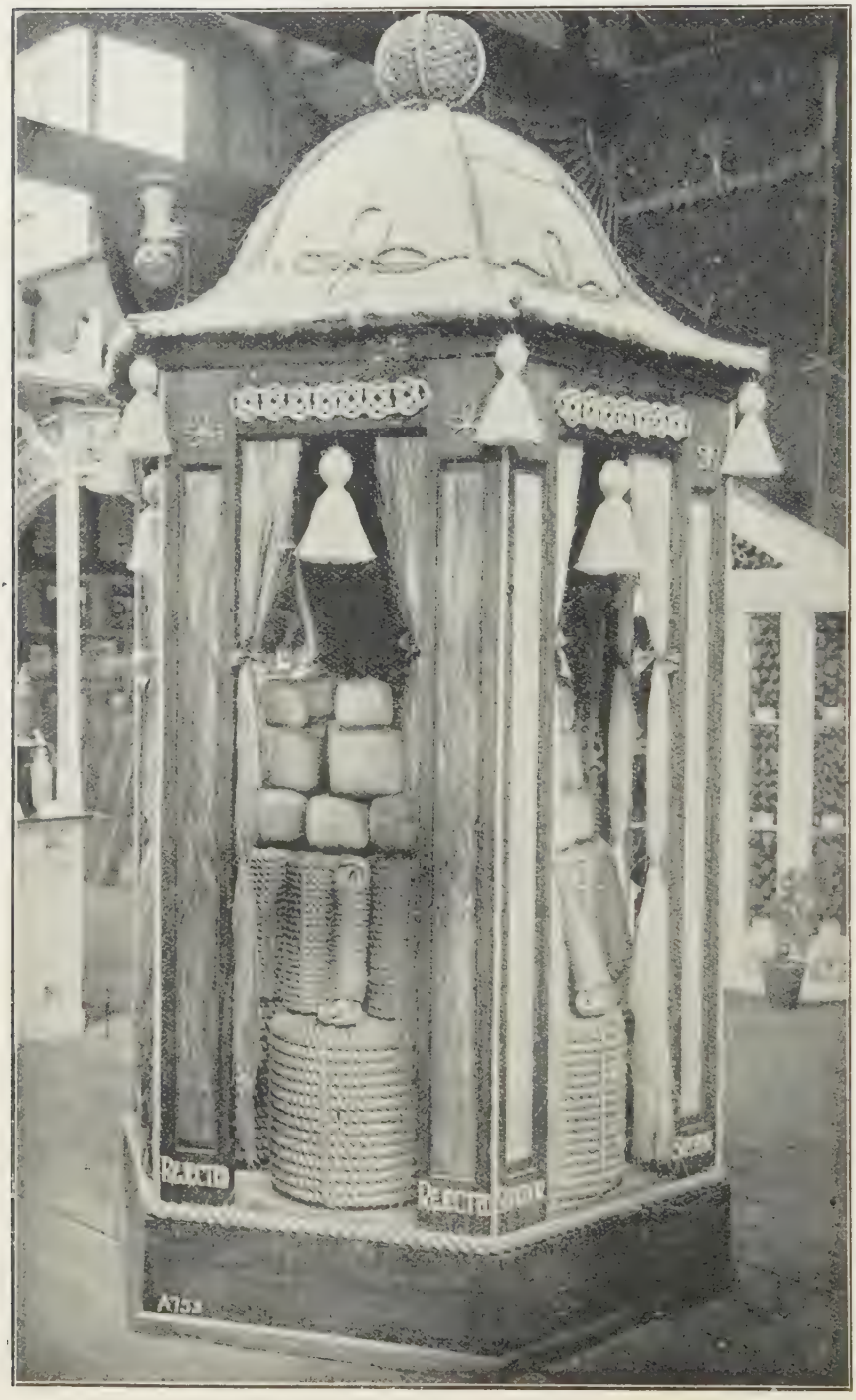
hundred ways, and puts a flush of independence, if not impudence, in' dad's eyes. It relieves the tension of unending toil, improves the place and the stock, adding to the returns from creamery and stockyard, makes the farmer a depositor, and not a debtor, at the bank. It buys pianos, carriages, and books for the family; it widens their outlook and links the farm with neighbours and the world. What the Bessemer patent was to the iron industry a generation ago lucerne promises to be to the present-day farmer. As an investment it is better and safer than Wall Street water or brewery stock. Lucerne is the best rotation crop; it restores the nitrogen of which grain and beets rob the soil, and makes it as rich as before the plough turned the virgin sod.

The destiny of this country and free government depend upon those who till the soil. Land-ownership and the public school are the antidotes for the poison that floods our country through the gates of Castle Garden. Every man who owns an acre of lucerne or sits beneath his own vine and fig-tree is a pillar in the temple of national safety. The man who ploughs a field and plants a tree can be trusted; he will defend the flag and never pollute it. Hay-fields and orchards, a pasture and a garden land, may not develop millionaires, but they will raise men and diffuse prosperity and independence. The prayer of the patriarch was that he be given neither poverty or riches. . . . The test of civilization is the average welfare of all, not the opulence of a few. . . . Those who raise lucerne and apples, who own and work their limited acres, will not be interested in the price of private cars, but they will never know the road that leads to insolvency. The bankrupt Court is an unknown continent to them, but their days will be filled with healthful, useful toil, and their nights with untroubled dreams. The tilling of the soil is the first of professions, the king of trades. There is no danger-line in land-culture, no shipwrecks, no collisions or derailments, no explosions, no risks or hazards to insure against. With industry, common-sense, and water the harvests are sure . . . . Altogether it is not only the oldest but the safest business. It is a self-reliant pursuit, a respectable vocation. No man ever attained such eminence in our country that he was not proud to claim the farm as his origin. . . .

If I am called in spring-time, no flower will be more welcome to my fleeting spirit than apple-blossoms; no monument would be finer to mark my place of rest than an apple-tree; and when I enter that realm where every month has its fruit, where flowers ever bloom, and woman is always young and fair, I can ask no heaven more perfect than where the fields are perennial with the purple and green of lucerne and the paths are embroidered with apple-trees in blossom and the air fragrant with their perfume.

Mr. E. Clifton, who has been appointed New Zealand Commissioner for the Panama-Pacific Exposition, and also Trade Representative in North America, left the Dominion for Vancouver on the 17th instant. He has relinquished his duties as Director of the Fields and Experimental Farms Division of the Department, and Mr. James Duncan, formerly Assistant Director, has been appointed Acting-Director as from the 1st January, 1914.

Agricultural Show Dates.—Marton District Agricultural and Pastoral Association, 11th February; Dannevirke District Agricultural and Pastoral Association, 11th and 12th February; Masterton Agricultural and Pastoral Association, 17th and 18th February; Waimarino Agricultural, Pastoral, Horticultural, and Industrial Association, 19th February.



THE DEPARTMENT'S HEMP-EXHIBIT AT THE AUCKLAND EXHIBITION.

THE HEMP INDUSTRY.

W. H. FERRIS.

DECEMBER proved a bad month for millers in the main producing districts—those of the Manawatu—the weather being the worst for the time of year yet experienced. The swamps were heavily flooded. This forced a number of millers to cease operations. Combined with the consequent decline in production the quality of much of the hemp milled by those who were able to continue operations was unsatisfactory, due to the muddy state of the watercourses and the general bad paddocking-conditions. In the Foxton district in particular a high percentage of low-fair hemp was produced. Apart from the effect of the weather on hemp quality fairly good work continues to be done by millers in the Wellington Province. Manawatu millers have been assisted in reaching a satisfactory standard by having a better quality of leaf to work with. In this connection the heavy rains and floods at the end of the year will no doubt have a beneficial effect.

In the Auckland and Southland districts the quality of the bulk of the fibre being produced is of an unsatisfactory standard. Especially is this the case in the former district. The principal defects have been due to careless stripping, bruised and improperly dressed fibre being the result. Quite a number of stripper-keepers in these districts consistently turn out a fibre with a slipped tail, rough and discoloured, due no doubt to having the stripper improperly set. It is impossible to correct this defect with the present scutching-apparatus. It should be unnecessary to emphasize that a badly stripped tail is regarded as a most serious defect by the spinner, as is also the matting of the fibre at the tips, due to the bruising of the fibre in the stripping process. When bruised fibre is being scutched broken threads are dragged down the hank and are caught by the improperly stripped tail, with the result that a tow-ball is formed at the end of the hank. These tow-balls are dreaded by the manufacturer, as they cause great waste in the carding process. This defect does more harm to the industry in the eyes of oversea trade than anything else.

A number of cases have been recently brought under my notice where weak, partially dressed and discoloured fibre has been packed with better quality. This is a practice which cannot be too strongly condemned. It is thoroughly bad for all concerned, but

it must react to the injury of the responsible shipper more than to any one else.

The general quality of the tow being produced is still unsatisfactory. During the past month several parcels of a most inferior description were sent forward for shipment. Little or no attempt had been made to prepare the material for export, the bales being comprised of unshaken tow mixed with flax bands, pieces of wood, dust, and other extraneous matter. Very little first-grade tow has been exported during the past few months. Difficulty has been experienced in disposing of this low-grade material. Yet the great bulk of this could, with just ordinary careful handling, be made into a first-grade article.

At a special meeting of the New Zealand Flax-millers' Association, to consider the applications for the bonus of £12,000 offered by the New Zealand Government for an improved process of treating *Phormium tenax* for fibre purposes, thirty-eight applications were considered. These included claims from all parts of the civilized world. A committee was set up to arrange for the necessary practical demonstrations.

In addition to the display of phormium fibre and its products made by the Department at the Auckland Exhibition, the New Zealand Flax-millers' Association has a good and comprehensive display of phormuim fibre, tow, and stripper-slips in a special court.

A striking feature of agricultural development in the Philippine Islands is the establishment of co-operative demonstration plots. Inspectors of Agriculture visit the farms and take charge of the plots, which are cultivated according to the best methods, although only by means available to the small farmer. The co-operating farmer gets the benefit of the example and of the increased crop gained by the improved methods. The system has given excellent results.

We can no longer entertain the notion that rural life shall remain isolated, disjointed, and unorganized. Its organization is a national, economic, and social necessity. It is more difficult to organize a scattered rural population than a concentrated one, but the great need is to give the rural population at least approximately the primary advantages which the town enjoys. The town is organization, and because of its organization and of its consequent advantages it has tended to attract the most ambitious youth of the country. The task of rural organization is difficult, but, as our greatest educator of America has said, "The difficulty of a task constitutes no reason for declining it." And in this way lies the largest promise for national upbuilding and stability.—*D. F. Houston, Secretary of Agriculture, U.S.A.*

THE APIARY.

F. A. Jacobsen.

Advancement of Type.

In nature a continual warfare is waged between individuals of every race of animal for the right to exist. Only the fittest survive. Thus the virility of a race is maintained and its power of claiming a place in the scheme of nature is assured. With the interference of man the development of special characters in an animal has largely changed the natural law of the survival of the fittest. Having supplanted nature, man fails and fails again in his desire to exceed his limitations. His most common mistake is to underestimate the importance of constitution, that character which nature takes such infinite pains to safeguard; and it is only when nature's demand in this connection is respected that man can successfully prosecute his work of improving the characteristics necessary to make the type respond more generously to his demands upon it. In improving the wonderful domesticated bee the work of man is especially difficult. In all other races it is the sire which is the main channel through which improvement may be effected; with bees it is the female which is the principal factor. Undoubtedly the greatest drawback experienced by the breeder of bees is the freedom with which the more notable varieties intermingle, and until such time as true line breeding has been made possible the absolute control and development of these varieties in the direction desired will remain in abeyance.

The Spread of the Industry.

Several cases have recently been brought to my notice which I will term "dummying" bee-sites. There is an unwritten law among beemen that any one selecting a site and starting an apiary shall have the location to himself within a radius of at least two miles. No one has the power or legal right to prevent any one else from starting within that distance, but still the rule is observed and acknowledged among the fraternity. It is based on the fact that an apiarist requires two hundred or two hundred and fifty colonies to make a living, and in this case he would often take up a much larger holding and perhaps run

one or two out-aparies. This code has recently been taken advantage of by certain individuals who have occupied large areas of country with good flora by placing at varying distances a number of empty hives. In this manner they hold the localities until such time as they have sufficient increase to extend. Such a practice is not honourable or commendable, and the associations should discourage it as much as possible.

Prior Rights.

When a person has started bee-farming in a certain spot and intends to work his few colonies into a large apiary, then any beekeeper will respect his prior right, but of course he should understand he has no hold on the locality until it is fully stocked. The practice of keeping a few colonies and giving out that it is the intention of the owner to increase largely in the near future has often been the means of driving an honourable beekeeper into a less rich district. Needless to say, the former's increase only makes up his winter losses, and he gathers a very large surplus of honey through occupying a large spread of country.

Directions for Work.

During this month it has been customary in previous years for the majority of beekeepers to commence extracting, but owing to the recent continuous rainy weather no doubt extracting operations will in nearly all cases be postponed until the following month. In any case it will be necessary to look over the hives frequently and perhaps add a super to some of them. There is every indication of a late and heavy flow of nectar. Beekeepers should therefore be prepared with plenty of surplus material in case its use is necessary. I would caution beginners to extract no honey but that which is sealed, and so procure a thoroughly ripe article. As with former directions, do not crowd colonies for room, and keep them supplied with plenty of ventilation by raising the brood-chamber off the bottom board by means of blocks.

A report is just to hand intimating the successful floating of "The New Zealand Honey-producers' Co-operative Company," which was registered at Hawera on the 20th December. It is the intention of the company to take shares in the New Zealand Farmers' Co-operative Association. I feel sure that every beekeeper will join with me in wishing the company success.

ORCHARD WORK FOR FEBRUARY.

W. A. Boucher.

Cultivation.

During the warm months of summer the cultivation of the orchard should not be neglected. If bearing trees are to bring their crops to perfection and young trees to maintain vigorous healthy growth, clean cultivation of the soil is essential in order to suppress any growth of weeds and grass and conserve the moisture for the benefit of the trees.

Codlin-moth.

Most growers of fruit on a commercial basis have for some time past realized that unless the necessary precautions have been taken considerable infection by codlin-moth and consequent loss of crop will occur during the month of February, in spite of careful and consistent spraying earlier in the season. Still, there are some commercial and many domestic growers who are still under the impression that all danger of moth-infection ceases by the end of January. In order to remove this erroneous idea it may be stated that a season rarely passes when a fairly heavy flight of the moth does not take place towards the middle of the month. Growers are therefore advised to spray with a reliable brand of arsenate of lead at any rate before the end of the second week of February. It may be stated as a matter of actual experience that some growers of apples and pears have commenced spraying early in the season, and continued carefully and consistently up to the end of January. Seeing but little sign of the moth, and considering that any further danger of infection was over for the season, spraying has been discontinued, with the result that a considerable amount of disgust has been experienced when a fair percentage of the crop has been lost through infection during the month of February.

Bitter-rot of the Apple (Glomorella Rufomaculans).

Some three or four years ago bitter-rot of the apple inflicted considerable and unexpected loss upon growers in some districts, especially in the North. This was due largely to unusual and quite exceptional climatic conditions, which induced and favoured

a sudden and continuous attack of the fungus *Glomorella rufomaculans*. Most of the other fungus diseases that attack growing fruits—such as apple and pear scab, &c.—make their appearance during the early part of the season. Bitter-rot, however, will hardly be noticed until the fruit has commenced to ripen. Fortunately, the climatic conditions throughout New Zealand are usually unfavourable for the development of this disease. Still, it would be as well for growers to keep their crops of apples under careful observation and, should bitter-rot make its appearance, spray with the Bordeaux mixture, 4-5-50 formula.

LEECH.

This is a pest that produces brood after brood during the season, and if the weather continues warm and favourable will cause considerable damage to foliage even as late in the season as the month of February, unless the necessary precautions have been taken to prevent this. It is important that the leaves of fruit-trees, whether in bearing or otherwise, should be kept in healthy condition until they drop naturally in autumn or early winter; therefore attack by leech late in the season should not be disregarded.

GRAPE-CULTURE.

S. F. ANDERSON.

THE notes for this month's work written for the *Journal* for February, 1913, should be referred to. The past season has been one favourable to growth, but not to early ripening of the grapes. In districts subject to mildew the prevalence of northerly and easterly winds will likely have developed this trouble more than usual. The later varieties are most subject to it (see notes for March and December, 1913, on this matter).

The importance of the grapes being fully ripe before placing them on the market has already been pointed out in former issues of the *Journal*. Growers are advised not to give way to importunities of the fruiterer or other purchasers to sell their fruit before fully matured for the table. It is very disappointing, after perhaps paying a high price, to get grapes that are found to be acid; especially is this so to an invalid. It is most unsatisfactory to all concerned, and may seriously affect the after-sales. The berry round the pedicel or stalk should be fully coloured and not showing the slightest tinge of green. When being obtained for an invalid they are better when showing wrinkled lines of overripeness.

PACKING GRAPES.

The box now being used for sending the grapes to market is a handy and convenient size. For the information of those who do not know it, the sizes of pieces to make it up are given, viz.: Tops and bottoms, four pieces each 18 in. by 6 in. by $\frac{3}{8}$ in.; sides, two pieces each 18 in. by $4\frac{1}{2}$ in. by $\frac{3}{8}$ in.; ends, two pieces each 12 in. by $4\frac{3}{8}$ in. by $\frac{3}{4}$ in. = eight pieces to each box.

These will hold, packed with some fine paper shavings, about 12 lb. of house-grown grapes; or outdoor-grown grapes, without packing, about 15 lb. It is better to err on the side of packing too firm than loose in both instances, for, tossed about as the boxes are in railway trucks and vans, they suffer very much if they are not firm. When packing the outdoor-grown, such as Golden Chasselas, Black Hamburgh, and the American varieties, pile them up above the level of the box somewhat, tack down one end, and then gently press down and tack the other end. The writer has sent Golden Chasselas from Hawke's Bay to New Plymouth packed in this manner, and they have arrived in perfect condition. They were transferred once from train to train at Palmerston North, and carted to and from train at each end.

VINEYARD WORK FOR FEBRUARY.

Thorough cultivation is an important work in the vineyard this month. It materially affects the quantity of saccharine gained by the grape—an all-important item in winemaking, the clean soil reflecting and maintaining the heat, in contrast to a weedy and close texture of the soil lowering these conditions and prolonging the ripening period. Dr. Guyot, who is recognized as one of the greatest authorities on vine-culture, has the following in his book: "Do not allow any foreign vegetation around the vines; neither any useless vegetation upon it. An absolute and permanent cleanliness of the soil from the first movement of the sap until the gathering of the fruit is the foremost condition for health, fecundation, fertility, and the ripeness of the grapes. Long grass (and weeds) deprive the vine of respiration and heat. The smallest weeds maintain upon the soil a pernicious moisture which prevents the airing and insolation of the ground. A vineyard planted on a lawn, were it mown every day, would never be fertile. The vine delights in soils the surface of which is rough and dry, even were it rocks or stones. Humidity and freshness are only favourable to the vine at a great depth, where its roots seek for them; for that reason deep cultivation is unnecessary, especially in light soils. Lengthened experience has proved that fact."

THE FARM GARDEN.

W. H. Taylor.

Vegetable-culture.

It is hoped that all planting as indicated in the last issue of the *Journal* has been done. If there are any arrears, bring them into line at once. We are at a time of the year when a week or two of delay may lead to failure. The state of the weather is a thing upon which no one can depend with certainty. We can only consider averages, and in accordance with usual happenings. Two or three weeks' time does not, perhaps, appear very important, but I know that it may make a very material difference. By the middle of January everything in the way of cabbage, broccoli, Brussels sprouts, and savoys should be out. When planted two or three weeks later they seldom succeed. Plants already out are assisted in a wonderful way by keeping the surface soil loose about them by cultivation. If a quick fertilizer is wanted, blood manure or dried blood may be given. Sow it like grass-seed close about the roots, when rain is imminent or during rain. Nitrate of soda, a teaspoonful to each plant, applied during rain is quickest of all in action, but should be regarded less as a fertilizer than as an agent to set other properties in action. Nitrate of soda, like salt, tends to make the soil moist, and is on that account of most value in dry land. All the Brassica family require moulding up after some amount of growth has been made. Moulding up not only prevents displacement by wind, but also promotes the formation of roots from the stem. Moulding should not be done too early. It is best to allow the plants to make fair growth first. If the plantation is of any extent they may then be moulded up with a plough, and, in any case, even if done with a hoe, the operation will cover weeds that have grown between the plants. The act of moulding will also destroy those between the rows, thus saving much labour. After moulding up no more weeding should be necessary, as the plants should quickly cover all the ground.

French beans may still be sown. The middle of February will, I think, be late enough for a last sowing in any part. In Wellington Province, sown at that time, they produce about half a crop, but are worth while.

It is now too late to sow *peas* with any reasonable prospect of obtaining sufficient produce to pay for the trouble. The advantage gained by providing sticks to support peas is well known to most growers. It may not be so generally known that the advantage is greater with the late crops than with any other. As a matter of fact, it is seldom that the late crops are so treated, which custom on my part led to the discovery. The late crops develop when the days are declining in length, the sun losing power, and rain becoming more frequent. The soil is damper, and the haulm, when lying on the ground, is seldom dry. This causes the pods to become diseased, and often the green matter decays. This state is almost entirely avoided by sticking.

Onions are now in full growth. In places where mildew is likely to occur, as shown by past experience, they should be sprayed with Bordeaux mixture of 2-2-40 strength. I have found a mixture of greater strength is harmful, so much so as to be as bad as the disease, perhaps even worse than it; but the strength now advised is safe and effective. Remember that it is useless to expect benefit from spraying unless the spray precedes the disease. If the disease is allowed to enter the tissues of the plant, spraying effects very little improvement. High and dry positions are seldom troubled with mildew. Onions seldom escape it on rich, moist flats. Towards the end of January and on to early in February is the time when it is first noticeable. It is, however, in existence for some time before it can be observed. Therefore spray early.

Turnips, lettuce, and *radishes* are still to be sown according to former directions.

Silver-beet should be sown during the next four weeks. When the plants are up thin to at least 12 in. apart; 18 in. between the rows is not too much. The larger the leaves are grown the more succulent they will be; and the quality is in accordance with the tenderness. It requires good soil and a fair amount of manure. I strongly recommend planting a good bed of this vegetable. It is sure to be appreciated in late spring when other green vegetables are scarce.

Spinach should be sown during the second week in February at the latest; it is, indeed, the best time. If sown much earlier it would not stand, and this crop should last through winter and until it runs to seed in late spring. Those whose acquaintance with spinach is limited to the article purchased from the greengrocer have no real knowledge of its excellence. The market grower does not thin much, and pulls entire plants, because that is the only practicable way of making bundles. In a private

garden the leaves are plucked separately. The larger they are the better will be the quality. To obtain large leaves the plants must be thinned to at least 8 in. apart in the rows, there being 12 in. space between the rows to allow room for cultivation. It goes without saying that good soil is necessary. Also, as it is a winter crop, though sown in summer, choose an open position with well-drained soil. Spinach, like beet, is rather a hard seed; and if sown in dry ground would most likely be rather long in coming through unless assisted in some way. When large breadths are sown the best way is to soak the seed, but a far better plan is to water the drills through the rose of a watering-pot after the seed is in and before covering with soil. The soil thus damped will retain moisture long enough to soften the seed and ensure rapid germination. In fact, if sown in this way in dry soil the young plants usually break through in about ten days.

Tomatoes.—Blight is more likely to appear on moist flats than in high situations, and also where, from any cause, free access of air is impeded. In the last-mentioned places particularly spraying should not be neglected, and under no circumstances neglect to keep laterals in subjection. If they are allowed to run they create a bad condition of atmosphere about the plants and induce attacks of blight. For similar reasons I would avoid putting large plantations of cabbages or broccoli in close proximity to tomatoes, as they create a moist atmosphere.

Small Fruit.

Strawberries.—Keep runners under control. If sufficient plants are laid for requirements cut all other runners off. Weeds should be kept out at all times. Never allow them to seed, and if a little sorrel or couch appears, dig it out at once or it will take possession. If irrigation is possible it is of great benefit to the plants, but let it be thorough or not at all. Surface watering is very mischievous. It encourages surface roots and fills the plants with water, making for a soft condition which wilts under strong sun-heat, because the surface moisture is quickly evaporated. The best manner of watering is by means of a hose with no nozzle. The water runs without a rush; therefore the soil is not washed. The water circulates quietly if the hose is laid on the ground, and if the land is level draw up a little bank of soil at the ends of the rows, so that the water will not run off, but will soak quietly into the ground. A thorough soaking once or twice a week will do an immense amount of good. In the absence of the means to water thoroughly a spraying only, to refresh the foliage, would be more beneficial than partial watering of the soil. It would cleanse the foliage from dust

and check insects, and would not draw the roots to the surface to be dried up on the next hot day.

Raspberries.—Where fruiting is over, time would be well spent in cutting out all the old fruiting canes. This would give more space to the new canes and relieve them of their competition in drawing moisture from the soil, which is not likely to be plentiful at this time. Keep spare suckers rigorously subdued.

Gooseberries.—If the advice to spray given in the December issue of the *Journal* has not been acted upon, it would be wise to do it now. It is really very little trouble to spray the bushes, and the effect of the spray—4-4-40 Bordeaux—in subduing leafspot is quite remarkable. Now is an excellent time to deal with bushes that are overcrowded. It is not an easy matter for a novice to determine what to cut out when the bushes are bare of foliage, but it is now quite easy to see where a bush wants opening up. The effect of letting in light and air will be very beneficial to the bushes, having great effect in perfecting the buds. Some of the best cultivators in England do most of the pruning after fruiting is over, reserving for winter only such shortening of laterals as may be needed. It is also a common practice there to manure the bushes in early autumn, it being considered that the manure is of the most benefit when next season's buds are being built up. This is certainly good logic, as without good fruiting-buds there cannot be good fruit.

Cape gooseberries require no other treatment than sufficient cultivation to keep the ground clean and to conserve moisture by means of the mulch which the loose surface provides.

FLOWER-CULTURE.

If wallflowers for next spring flowering have not been sown, get the seed in at once. This is a good time to take in hand the raising of many flowering-plants by seed, more particularly so because it is otherwise an off season for this work—that is to say, there is not a stress of such work at the present time as there always is in spring-time, and usually is in autumn. Hence it is wise to take this opportunity to use space that may not be easily spared at any other time. All kinds of perennial plants, such as shrubs, trees, and herbaceous species, may be raised. The species that may be dealt with are too numerous for special mention, but the types that may be raised include such things as *Clianthus puniceus*, *Acacia Baileyana*, passion-flowers, tacsonias, abutilons, *Anchusa italica* (a very showy plant, similar to forget-me-not, but with larger flowers dark blue in colour), columbines, aubrietias (a very useful winter and spring flowering perennial), auricula, bignonia (very fine climbers)—*Campanula persicifolia*, carnations, *Cerastium tomentosum*

(for edging), and *Arabis alpina*. Delphiniums raised now will make fine plants for flowering next season, and are one of the grandest of garden plants. *Eupatorium riparium* is a useful plant, sometimes called "spiræa." Gaillardias. *Geum coccineum* is an old-fashioned plant, and is very useful, growing well anywhere: *Gypsophila paniculata* is the favourite variety, *elegans* is not so useful. The first-named variety gives sprays of tiny white flowers which are most useful for decorating and, when dried, last for many months. Most of the biennial plants are as well raised a little later. Where bedding is carried out to any extent an early start must be made with propagating. Early in February is a good time to strike cuttings of zonal pelargoniums—geraniums—in the open ground, and this is the handiest way where there is no frost. Where frost prevails they should be raised in boxes so that they may be placed under shelter of some kind when frost is imminent. Foliage varieties of pelargonium, both bicolour and tricolour, are best raised in boxes, unless there be under the shelter of a wall a specially suitable spot where the soil is light and well drained. It is well to remember that cuttings raised in the open ground give comparatively little work, and the percentage of successful strikes is usually greater. This plan should always be adopted where practicable. Frost is the only bar to its adoption.

Dahlias.—These plants require very little skill in cultivation once they are started. To grow to their best they require good soil, with some stable manure deep down in the ground. A good mulch in dry weather is better than frequent watering. Too much water is liable to produce flowers with loose centres, and liquid manure may have like results. Solid growth is necessary to produce good double flowers. A certain amount of thinning of shoots is often advisable; this is sure to be the case with old tubers that were not lifted and divided. The plants should not be crowded with branches, as this induces spindly, weak growth, which will not give good flowers. Some varieties when crowded assume a pendulous habit. The growths, being weak, droop on the ground. J. H. Jackson is an example of this habit; correct it by timely thinning and tying up.

Carnations.—Continue to put down layers as advised previously. Get this work finished as soon as possible now. Carnations do not root freely when left too late. Seed of any of the many races may now be sown in boxes. The treatment that the seedlings receive has much to do with the ultimate success of the plants, which may differ very much with varying circumstances. I have seen them well grown in houses that are exceptionally hot, and equally well in the open air after they have been well started. The great point appears to be that they must have plenty of light, and they also have a strong aversion to dampness.

THE POULTRY INDUSTRY.

F. C. BROWN.

FEBRUARY WORK.

THE coming month is an excellent time to cull out the second-year birds. Any showing signs of moulting should be disposed of at once, for their profitable laying-period is past, and they will be useless for the breeding-pen. A close watch should be kept on these second-season layers from now on, for they will only be kept at a loss when they cease laying. It should be possible to detect these birds before the moult has actually commenced, and culling should take place before the change of plumage sets in, as the birds can then be marketed to advantage. Indeed, if the culling be postponed the loss will be considerable, for probably the birds will then have to be kept until they take on their new feathers, as they can never be profitably marketed when in heavy moult. From the poulterer's point of view the bird in moult is difficult to dress and never presents an attractive appearance. The ideal of the poultryman should never be to have on the plant a bird which is not paying its way. A cockerel should never be kept longer than five months, and while pullets may be culled to advantage in their first season the hen should never be kept a day after the conclusion of its second season's laying, except, of course, where it is such a creditable member of a heavy-laying strain and is of such undoubted constitution that it will pay to retain it for breeding purposes.

FORCING EGG-PRODUCTION.

It is common in these days of heavy-laying stock to hear it declared that forcing for egg-production is being overdone, and that if it is persisted in the virility of the stock will decline and the power of production will decrease at the same time. While there is an element of truth in this contention, the fact is overlooked that there are poultrymen in the Dominion who are well aware of the evils in forcing production beyond the limit, and are working on safe lines. Where the danger lies is in forcing fowls to the utmost and placing them in a breeding-pen at the conclusion of a heavy-laying season.

At the Government poultry plants, where the great bulk of the birds are used for breeding purposes, forcing for egg-production has been discarded. The whole object is to have the birds in the best possible condition by the time the breeding season arrives, and this cannot be done where every effort is made to establish sensational records. The breeders are selected on type and constitution, breed points, of course, not being forgotten; and it is considered that this enables the best birds to be selected as breeders. Some years ago, when the breeders were selected according to the performances put up, the results proved disappointing time and again, the stock of the record layers being unsatisfactory as to laying-power and constitutional vigour. When, however, the breeders, chosen on type, were never forced, but were given every opportunity by ample exercise and plain feeding to lead healthy and natural lives, they left strong stock capable of heavy production when placed on a forcing diet. Several noted private breeders are following the same principle, realizing that if the average production of the flock is to be high the birds must have the desired constitution and come from parents which, never having been unduly forced, are capable of imparting this. There is certainly a limit to production with birds intended for breeding purposes, though with birds that are to be kept for egg-production only, forcing for eggs, provided the pullet be well developed when this commenced, is necessary if the desired profits are to be secured.

The importance of marking the young stock, as a future guide to separating the birds according to age, is not appreciated as it should be. All birds hatched this season should be properly marked without delay. Perhaps the simplest method is to punch a hole in the web of the foot, keeping a particular section of the web of each bird for the particular season.

Precocious Pullets.

I have received many complaints of pullets commencing to lay at too early an age—at about four months old. This is, of course, very undesirable. The birds cannot, under the circumstances, grow into vigorous stock, while from a productive point of view they will probably prove unprofitable, and it is not unlikely that their eggs will never be of a satisfactory size. Then they will be undesirable breeding-stock next season. They will, no doubt, lay for a few weeks, and then go into a moult with the old birds. This premature development is due almost altogether to mismanagement, principally in the matter of feeding. Where fowls have been bred to an extreme egg-producing objective generation after genera-

tion, the natural inclination to lay is so strongly developed that no forcing methods are needed to make them lay as soon as they have reached the correct productive age.

No doubt many have been led to force the pullet owing to the incorrect doctrine promulgated that early maturity is an indication of egg-laying power, and that premature laying is a sign of the desirable breeding-bird. There is no greater fallacy. I have repeatedly emphasized—and the principle cannot be reiterated too often—that constitution is the basis of successful breeding. In all branches of live-stock breeding this is the recognized foundation-stone; but with the high-type layer, upon which there is such an exceptional strain, constitution is of special significance. And constitution will never be secured if a bird of heavy-laying strain is brought to profit before it is fully developed. Of course, it will be realized that I am not speaking of the early laying of the well-developed bird, but of the pullet which commences to lay when only little more than half grown.

The weakness in the great campaign of increasing egg-yielding power is the loss of size not only in the bird, but in the egg she produces; and it should be the aim of every utility poultryman to correct this tendency. It will certainly never be corrected—on the contrary, it will be encouraged—if the pullet is to be forced to commence laying before she is thoroughly fitted for the work. If any example were needed to prove the fallacy of selecting the layer and breeder on prematurity, it is surely provided by the egg-laying competitions. The leading pens in these, without exception, are birds which have not commenced to lay until six or six and a half months of age. As to size, it is advisable to choose for the breeding-pen the hen of a slightly larger size than that of the ideal weight, for it is easy to lose in weight of stock, but much harder to maintain the desired size without introducing coarseness into the type. The small ones will always come to vex the breeder.

Separate the Sexes.

A common mistake at the present time is to run the cockerels too long with the pullets. If the cockerels are to be well fed in order to put them into marketable condition at a profitable age, the pullets will be unduly forced. The cockerels should be rapidly developed, and to this end should have restricted range and a rich diet; whereas the pullet should have good range and an ample but a simple ration. In other words, the cockerel demands artificial conditions, and the pullet as natural a scheme of treatment as

possible. More harm is done the layer by coddling — from the brooder onwards—than by anything else. This does not imply, of course, any stinting of diet, but rather that the management should be such that everything should tend to strong development of the layer, and nothing in this connection can take the place of full opportunity to grow to the very best advantage. When it is found that the pullets are making premature development their diet should be changed, and a plainer one substituted. The safest plan in this case is to confine the ration almost to oats—crushed for preference —and an abundance of green stuff.

Under all circumstances the sexes should be separated as soon as the sex can be determined. Remove the cockerel before he commences to crow. This will be to the advantage of the pullet, and will earlier enable the cockerel to reach the desired table condition.

DISEASE.

The treatment of disease in poultry is merely a case of prevention. Curing disease cannot enter into the realm of utility poultry-keeping. Prevention is the only policy. In the first case, the stock must have the constitution to combat the attack of any disease, and cleanliness must be paramount if disease is to be prevented from getting a foothold in the houses and runs. While dark and damp houses are prolific sources of trouble—for these exclude sun and air, the great enemies of parasitic life—all corners and crevices, if allowed to become collecting-places for dirt and manure, become grounds of infection. In the hot weather insect-life is plentiful, and while spraying of the house with a strong disinfectant is now necessary, the birds should also be provided with good dusting-baths, in order to give nature an opportunity to fight the attack of parasitic forms of life. While it seldom or never pays to doctor an individual bird, it will always be worth while to attack an epidemic. The badly affected birds should be destroyed at once, and any showing symptoms of the trouble isolated. The quarters should be thoroughly cleaned, and every endeavour made to find the cause. Further trouble will be obviated only by removing this. Diet and good housing are the great essentials in the well-being of poultry, and on these mainly depend the maintenance of good health.

"THEY EAT TOO MUCH."

When I was recently introduced to a farmer as the Government Poultry Instructor, he remarked, "Oh, bother poultry; they eat too

much." This is very true of the bulk of the farm poultry of the Dominion. They eat too much for the eggs they lay. If all hens in farm flocks were disposed of at the end of their second laying season instead of being made old-age pensioners, and if only pure-bred stock of a laying strain were used, our farmers would soon discover that the food consumed by their fowls represented money well expended, and that their poultry were as profitable as their other stock.

THINGS TO REMEMBER.

Irregular feeding is often the cause of many disorders in poultry.

Charcoal is cheap enough, and is an excellent thing for poultry.

The absence of green food means an undesirable pale colour in the yolks of the eggs.

Laying-hens should have all they can eat, and this should be of a high-grade character.

In hot weather it is no indication that the fowls have had enough if they leave their food.

Neglecting to give fowls a regular supply of water is a serious matter. Dark combs are often an indication of neglect in this respect.

Sudden changes in the system of feeding are often responsible for vexation and loss. Any contemplated change should be made by degrees.

Cockerels to be fattened for the market should be fed well from the first, and confine them in a small space. They will be profitable only when turned off in the shortest possible period.

Do not waste feed on unprofitable stock. It is only when the returns show a profit over cost of production and keep that birds should be retained.

It is impossible to raise vigorous stock ; these are not kept in the pink of condition. Protection from climatic extremes, absolute cleanliness, and a good supply of green feed are essentials to this end.

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

Dairy Cows.

"Agri," Auckland :—

What breed of cows is the best for buttermaking ?

The Dairy-produce Division :—

In answer to the foregoing inquiry it cannot be said that there is any best breed of dairy cows for buttermaking, for all the well-known breeds contain animals which prove to be equally profitable. In selecting a breed the farmer should be guided to some extent by the class of land he owns. For example, it would not be wise to use some of the heavy breeds, such as the Holstein stock, on a farm that was too rough and hilly. Some of the lighter animals would be more suitable under such conditions. For a dairyman to be successful he must have an ample supply of feed and also a good water-supply, and having these he can safely become the owner of any of the recognized breeds of dairy stock, such as the Holstein, Jersey, Ayrshire, or even a good crossbred herd of cattle, but invariably he should use a purebred sire of a well-known milking strain.

Buttermaking.

"Buttercup," Norwood, Cave :—

I shall be obliged if you could give me a few hints about putting butter into cool store for the winter. I am making about 40 lb. per week of separator butter. If put up in pats, in paper, and stored, would it be likely to come out in marketable condition ?

Also, what is the cause of streaks in butter ?

The Dairy-produce Division :—

The usual custom is to commence the storage of butter for winter use not earlier than the beginning of February, but much depends upon the length of time it is desired to hold the produce before sending it to the market. First-class butter will remain in a sound condition, if properly frozen, from four to six months or even longer. It may be put up in bulk or in pats, but in either case the boxes should be lined with a double thickness of parchment paper. As to whether or not the butter turns out in good condition depends wholly on its quality when made and the temperature at which it is held in the freezing-chamber. The latter should not be above 10°.

Streaks in butter are caused through improper mixing of the salt when it is being worked into the butter. You are probably aware also that long exposure to air will discolour the outside of butter. A bulletin entitled "Buttermaking on the Farm" has been posted to you.

CHEESEMAKING.

"FIVE-YEAR COLONIST," Rangiora :—

I have been particularly interested in the articles by Miss Davies dealing with cheesemaking, expecially that in the June number dealing with fancy cheeses. I should much like to see an article dealing with these more in detail. There was a cheese very popular in London some years ago, but I have not seen it here. It was known as a "cream cheese," and I fancy came from Cambridgeshire.

Would it be practicable for a couple, elderly, but still active, wishing to retire from town life and fond of country pursuits, but without any practical knowledge of cheesemaking, to make a living by buying milk and making small cheeses such as the above named and others without any large outlay of capital? Also, if the idea is feasible but practical experience quite necessary, what is the best way of obtaining it, and how long would it take?

The Dairy-produce Division :—

In reply to the above we are sending a copy of the bulletin by Miss Davies on "Soft-cheese making," in which particulars are given as to the manufacture of cream cheese.

While it would not be impossible for an elderly active couple to take up the manufacture of soft and fancy cheese, it has to be remembered that the success of the work depends mainly on turning out a uniform and high-class article, and without some previous experience in cheesemaking it would be very difficult to do this. Of course, much also depends upon the maker. Owing to the fact that there is not yet a constant demand in New Zealand for this class of cheese, and that it will be some time before the consuming public are likely to call for it, we would not recommend private individuals to purchase milk for the making of these cheese. Those who take up this side-line in dairying must be prepared to do a considerable amount of advertising and spend a little money in working up an established connection.

GRASS-GRUB.

MR. CYRIL T. WHITE, The Peaks, Canterbury :—

Please give me advice as to the best means of treating a grass-paddock infested with grass-grub. The land is fairly light, and has been sown down only two years, but the grub has destroyed half of it. The land is capable of growing rape, turnips, and oats. I may say that adjoining paddocks do not appear to be affected.

The Fields and Experimental Farms Division :—

This pest is rather partial to light, dry lands, and grass land is the natural breeding-place. No effective means are known to avoid or stop attack on grass or clover paddocks except ploughing up, which is best done about the beginning of March. A careful system of crop rotations, with thorough cultivation, is about the best means of avoiding injury by this pest. The applications of chemicals to the soil to kill the grub has so far not proved effective.

DAIRY-FARMING.

"BEGINNER," Opotiki :—

I intend milking eighty to a hundred cows next season, and would like your advice as to what you think best for me to grow to maintain good returns until the end of the milking-period. The grass seems to give out about February and March, so I would need to have a stand-by from then on.

How many acres would I need to plough?

What dates would I sow?

What would you advise me to sow, and what amount of seed? The land here is fairly good, but short of lime.

Do any of the Government farms breed Ayrshire cows? Could I procure a bull from them? Do any of the Government farms breed pigs for sale?

The Fields and Experimental Farms Division :—

During the dry months in summer, maize is looked upon as the best of all fodders, but it will not stand frost. This might be overcome by sowing, say, 1 bushel of oats with maize, which will act as a shelter from frost. Maize, 1 bushel, and oats, 1 bushel, per acre, sown broadcast with grain-drill at the end of October, would be fit for cutting in January. Oats or barley and tares give a large amount of feed summer or winter—say, 10 acres sown in November would be fit for feeding off in January. This would provide a large amount of valuable feed right through the winter, and if a dividing-fence were run through the centre, one half could be fed off while the other part was recovering. The quantity to sow is about 2½ bushels of oats, or the same of barley with 1 bushel of tares.

If it be decided to grow maize, it is recommended that 2 acres be sown in the middle of October, 3 acres in November, and 1 acre in December. This will allow of continuous feeding-off.

Maize should be cut before the flowering stage and carted out to stock. Two bushels of maize per acre should be sown, with 2 cwt. or 3 cwt. of superphosphate.

In the dry months of summer there is no better milk-producer than maize. At the Weraroa Experimental Farm up to 75 tons per acre have been grown.

In the current issue of the *Journal* there is an advertisement regarding Ayrshire bulls and Berkshire pigs for sale at the Moumahaki Experimental Farm.

RATS DESTROYING CHAFF.

"IGNORANT," Waikiekie :—

Is it true that rats will not destroy chaff if it is left in a heap on the floor ?

The Fields and Experimental Farms Division :—

Heaping of chaff on a floor does not prevent rats from eating and destroying any grains of oats or wheat which may be in the chaff. When chaff or grain is bagged and stacked it affords shelter to the vermin, which are protected against enemies and thus allowed every opportunity to breed and spread. They also cause great loss by damaging the bags and destroying or fouling the grain. The object, therefore, of heaping grain or chaff on floors is to prevent the breeding of vermin and the destruction of the bags, &c. When the grain is heaped it is found that very little is actually destroyed. This plan is generally adopted in large grain-stores.

TREATMENT OF SMUT IN GRAIN.

"SUBSCRIBER," Ashburton :—

Will you please explain the hot-water treatment for the destruction of loose smut in infected grain ?

The Fields and Experimental Farms Division :—

This treatment has been tested at the Canterbury Agricultural College, Lincoln. Dr. F. W. Hilgendorf, of that institution, supplies the following information concerning it :—

"The treatment is directed against the loose smut with the interval resting stage, this form being much more difficult to kill than that in which the spores rest on the exterior of the grain from harvest to seed-time. The treatment consists in soaking the wheat for five to seven hours in water at 63° to 72° F., draining, and then steeping for one minute in water at 129 2° F. (54° centigrade). The seed is then dried, and sown in a plot isolated from other wheat. The treatment should kill all smut on or in the seed, and if no smut-spores blow on to the resultant crop, its seed will be free from smut-spores, and therefore cannot need pickling. In steeping the seed in hot water I use trays made of perforated zinc and do 20 lb. at a time. At this rate one does 2 bushels per hour.

"The treatment is apparently a complete success. Two years ago our Bordier wheat showed exactly 5 per cent. of smutted heads. This year I have been unable to find a single smutted head on 70 acres of wheat the parent seed of which was hot-watered, while on 30 acres not so treated smut is about as plentiful as usual."

STACK ENSILAGE.

"ENQUIRER," Rock Hill, Weber :—

Could you give me some information as to the making of stack ensilage? I have a good paddock of good grass, but owing to so much wet weather I am afraid I cannot make hay of it. Could you assist me by giving me the proper heat, &c., and the way to do same?

The Fields and Experimental Farms Division :—

The crop should be cut when in the most succulent stage, or ten days before it is ready to cut for hay. At this time of the year it is necessary to clear the land almost as fast as it is cut, in order to prevent the material getting too dry. For a paddock of 10 acres set out the foundation nearly square. If it is a heavy crop make the stack 24 ft. by 18 ft. Collect enough material to raise the stack to a height of 8 ft., and let it remain until the temperature reaches 130°. This is ascertained by letting a dairy thermometer attached to a piece of string down an inch pipe within 3 ft. of the bottom. Put the thermometer in perpendicularly. When the stack has reached the necessary temperature stacking may be proceeded with by adding from 3 ft. to 6 ft. daily according to the heat. If the temperature rises quickly, add a larger quantity; if it is slow in rising, add less, endeavouring to prevent the temperature rising above 135° F. On completion, cover the stack with fine earth to a depth of 24 in. without delay.

When building, a sprinkling of salt should be added to every other layer—about 2 lb. of salt to each ton of green material. The middle of the stack should be kept only barely level with the sides—the reverse method to that adopted in building a haystack. Special attention should be given to this so that the stack will settle down evenly.

LUCERNE.

"SUBSCRIBER," Heathcote, Christchurch :—

I have a paddock, 3 acres, now in fallow, and I thought of putting it in lucerne for green feed and hay. It is deep silty soil, and has a good fall. Would you kindly tell me the best time to plant, the best kind of seed, and where to purchase same free from noxious weeds? What kind of top-dressing manure should be used?

The Fields and Experimental Farms Division :—

Lucerne can be sown in spring when the soil is sufficiently warm, or in early autumn. Marlborough-grown seed gives good results. Clean seed can be obtained from most reputable seedsmen in Christchurch.

It has been found that lucerne will grow in most places in Canterbury without being top-dressed with manure. If it is considered advisable to apply manure, this had better be provided in the preceding crop. If desired to apply at the time of sowing, basic slag 3 cwt. and kainit 1 cwt. per acre would be suitable.

CULTIVATION OF VARIOUS CROPS.

M. G. D., Waikouaiti :—

1. Would you let me know the proper time to cut peas sown with oats in the autumn for May feed in the following winter?

2. Also what is the proper time to cut Cape barley for same? This was sown for spring feed, but did not come away in time.

3. Could I get a second crop of Cape barley by manuring it? Would it be too early to sow Cape barley and tares in January for late autumn feed?

The Fields and Experimental Farms Division :—

1. When oats and peas are grown as a dual crop the harvesting should be at the time the oats are in milk. For an early soiling-crop, when it reaches a height of 2 ft., daily cuttings can be made and fed to stock as a green forage.

2. For autumn feed, the best time to sow Cape barley is March, and if it be a normal season it should be ready for feeding off in May. If care be taken to feed

off before it reaches the jointing stage, it can be stocked three and sometimes four times before being exhausted. For cutting for soiling purposes, this should be done the first time before it comes into the shot leaf. Manuring is best done before or at time of sowing the seed.

3. For Cape barley and tares sow early in March.

A Sheep-farming Query.

"Waverley," Wanganui :—

Would you kindly say whether a lamb born in March is a lamb or a hogget in September ?

The Live-stock and Meat Division :—

There is no fixed time in deciding the question as to when a lamb becomes a "teg" or "hogget." It depends upon the custom of the country or district of that country, and also as to whether the lambs are bred for fattening or for running on. Lambs are not dropped in this country in March, so you are evidently referring to the Old Country. In many districts in England a lamb is termed a "lamb" until it is weaned, then it is called a "teg" or "hogg" until the first shearing. After that the term "one-shear" or "shearling" is used.

Cause of Death of Calves.

"Matamata," Walton :—

Some of my calves—aged two to eight months—fed on skim-milk only are dying. The man who feeds them wants to know why they die.

The Live-stock and Meat Division :—

Your question gives no information upon which we could give a definite reply. There is nothing in clean skim-milk to kill calves, though it certainly does not contain everything necessary for the proper growth and development of the system, combined with the maintenance of sound health. We would point out that we cannot furnish satisfactory replies to queries unless full and detailed particulars be given.

Drying-off Dairy Cows.

Mr. Alfred Troup, Otarere :—

Which of the two ways is the proper way to dry off a cow at the end of the season—whether to stop milking her every other day and turn her out, or to strip her clean for a while after the season—so as to have your cows come in sound the following season ?

The Live-stock and Meat Division :—

We do not see much difference in your two ways. A combination of both of them is desirable, but it will depend upon the amount of milk you get from the individual cow, some cows being much easier to dry off than others. Gradually reduce the periods of milking until you get hardly anything ; then you can let her go for a couple of days, and, if nothing can be got then, you can let her go altogether. If you get a certain amount of secretion, bring her up in another two or three days' time, and then see. If you have reason to believe that contagious mammitis is prevalent in your herd, it is a good practice to inject half a cupful of 4-per-cent. lukewarm solution of boracic acid into each teat after the final milking, and leave it in.

Ailment of Calf.

"Ignorant," Waikiekie :—

I had a calf about three weeks old when still on new milk started to scour very badly, passing a red matter mixed with blood, and at the same time straining very badly. At last the straining became so bad that I shot the calf. Could you tell me what was wrong with it ?

The Live-stock and Meat Division :—

The scouring may have been due to something in connection with the milk or the method of feeding. It is more likely, however, that it was due to the introduction of micro-organisms into the system through the navel either at the time of or soon after birth. The so-called "joint evil" in foals is caused in the same way, and it is not uncommon to find joint lesions in these cases of scouring in calves if they live long enough. Medicinal treatment is of no use in these cases. You can, however, to a great extent prevent it by seeing that the calves as soon as they are born are put into a clean shed in which fresh straw has been placed. It is by contact of the newly ruptured umbilical cord with dirty litter that the micro-organisms gain entrance. Clean out and thoroughly disinfect the shed and burn any litter that can be burnt, digging the remainder into the ground where calves cannot get access. Provide clean straw for the pen, and paint the navel of every calf with ordinary tincture of iodine as soon as possible after birth.

SILVER-BLIGHT.

MR. A. S. DUNNAGE, Patoka :—

Would you kindly let me know if there is any cure for silver-blight ?

The Orchards, Gardens, and Apairies Division :—

Silver-blight is a difficult disease to control, but we have found the application to the soil, round the feeding-roots of the affected trees, of from 4 lb. to 6 lb.—according to the size of trees—of either sulphate of ammonia or sulphate of iron in the early spring has proved effective as a remedy in some instances. Growers in the Stoke district, Nelson, have found that spraying affected trees when in foliage with a strong limewash, about as thick, in fact, as whitewash, apparently effective. This method is also well worth trying.

APPLE-BLIGHT.—GUMMING OF FRUIT-TREES.

MR. F. SMITH, Wakatu Post-office, Nelson :—

What is the name of the blight on the apple-leaves enclosed in my letter, and what shall I spray with ?

What is the cause of gum on cherry-trees, and does it kill them ? One of my cherry-trees died. What will remedy the gumming ?

The Orchards, Gardens, and Apairies Division :—

The yellowish marks on the apples are not due to disease, but are a physiological defect which is generally noticeable on young trees. As the trees grow older this defect will, no doubt, disappear.

Gumming of fruit-trees is considered an indication of conditions unfavourable to the thrifty growth of the trees, such as an excess of water or of drouth in the soil. If the gumming is excessive it will seriously interfere with the welfare of the trees. When there is an outbreak of gum it is desirable cleanly to remove all the unhealthy bark, cutting clean to sound bark and covering the wound with paint or wax to exclude the air.

GROWING STRAWBERRIES.

"STRAWS," Ramarama :—

Kindly inform me if you think it best, when growing a bed of strawberries, say, for four or five years, to cut the blossoms off the first year, thus preventing them from fruiting ?

The Orchards, Gardens, and Apairies Division :—

If the strawberries are well rooted and putting on a good growth the first year there is no necessity to nip the blossoms off.

It is advisable to renew the beds after the third year, as the plants generally become exhausted in that time. Good strong runners from the old plants should be planted to take their place.

SPRAYING FRUIT-TREES AND TOMATO-PLANTS.

"ASCOT," Otaki :—

In spraying my fruit-trees I put about a large heaped-up dessert-spoonful of arsenate of lead in a kerosene-tin full of water, and spray once a month or six weeks. Do I do rightly ?

Would the above spray be any good for tomato-plants ? If so, how often should they be sprayed ?

The Orchards, Gardens, and Apairies Division :—

Arsenate of lead is used at the rate of 1½ lb. to 50 gallons of water for the control of insect pests such as codlin-moth, caterpillars, &c.

In spraying for control of codlin-moth the spray should be applied, if necessary, at intervals of fifteen to seventeen days until three weeks before the fruit is ready for gathering.

Arsenate of lead will destroy the caterpillar which attacks tomatoes. Arsenate of lead is purely an insecticide, and is of no use in controlling fungoid disease, for which the Bordeaux mixture is recommended.

BLIGHT ON APPLE-TREES AND GOOSEBERRY-BUSHES.

"SUBSCRIBER," Cheviot :—

The enclosed twigs are cut from an apple-tree, I think a Ribstone Pippin. Could you please inform me what the disease is that is affecting them, what is the best remedy for it, and when should it be applied ? The disease first became apparent about the time the fruit began to set, and it has been spreading ever since, and now practically the whole tree is more or less affected.

I also have some gooseberry-bushes which are badly infested with very small orange-coloured mites about the size of small bird-lice. They are very active, and are continuously running about on the leaves. The bushes have a sickly appearance, the lower leaves being quite yellow. What are the mites, and what is the best way to get rid of them ?

The Director of the Orchards, Gardens, and Apairies Division :—

The apple-trees are attacked by powdery mildew, which attacks the young growth early in the spring. The trees should be sprayed as early as possible with the 4-5-50 formula of the Bordeaux mixture, and a second time if necessary after an interval of from fifteen to seventeen days.

It is not possible to identify the mites on the gooseberry-bushes without specimens. If specimens were forwarded the mites could be identified. Kerosene emulsion would probably control them, but I can reply more positively after receipt of specimens.

DISEASES OF FRUIT-TREES.

MR. CHARLES JUDSON, Little River :—

Would you kindly inform me what kind of disease these leaves are affected by, and what mixture to use, and what time to spray them ? Is it necessary to use a spray ? They are small trees, just planted last year.

The peach-leaves (No. 1) curl up and blister red. The nectarines, plums, and pears seem to get eaten away.

The Director of the Orchards, Gardens, and Apairies Division :—

The leaves were very small, and reached me in bad order. They are attacked by shot-hole fungus, and also by beetles. To control the former, spray at once with the 4-5-50 formula of the Bordeaux mixture. For the latter, spray with arsenate of lead as soon as possible.

The peach-leaf is attacked by peach-curl. To control this disease the trees should be sprayed with the 10-10-40 formula of the Bordeaux mixture in the autumn when all leaves have fallen, and again in the early spring when the buds are beginning to swell. To apply this spray in summer when trees are in leaf would damage the foliage of peach-trees, although the summer strength is quite safe on apples, pears, &c.

ORCHARD WORK.—RUAKURA FARM OF INSTRUCTION.

"NEW CHUM," Colac Bay, Southland :—

1. Kindly inform me what variety of apples, plums, and cherries would stand the very changeable weather of Southland, and suit best the bush soil?
2. Is 10 ft. square too little space to plant four young trees, and will it be enough to plant all the trees in the orchard?
3. Is clover a nuisance in an orchard? What variety would you advise growing in an orchard to suit bees?
4. Can I get lodgings—that is, bed and meals—at the Ruakura Experimental Farm? What would it cost for the whole season to study apiary and orchard work, together with lodgings?

The Director of the Orchards, Gardens, and Apairies Division :—

1. I would advise you to communicate with the Orchard Instructor for your district (Mr. W. T. Goodwin, Department of Agriculture, &c., Dunedin), who is no doubt acquainted with the nature of your land and conditions generally. He will thus be in a better position to advise what varieties of fruit-trees are best suited for your locality.
2. The distance apart recommended for fruit-trees planted in an orchard is from 17 ft. to 20 ft. on the square. 10 ft. apart would no doubt be sufficient for three or four trees planted in a kitchen-garden.
3. The laying-down of clover or grass permanently in an orchard is not recommended, as better results are obtained by constant cultivation of the ground between the trees. Of course, clover could be sown as a cover crop, and then ploughed under in the winter or early spring. The extra nitrogen and humus thus added to the soil would greatly benefit the trees. White clover produces the best honey.
4. It is very doubtful if accommodation can be secured at the Ruakura Farm of Instruction. It would be advisable for you to communicate direct with the Manager, Ruakura Farm of Instruction, Hamilton, Waikato, who will be able to give you full particulars.

BLACK-SPOT ON PEARS AND APPLES.

MR. J. B. HAXTON, Te Kauwhata :—

Has 1 lb. of bluestone to 25 gallons of water been tried for black-spot on pears and apples as a winter wash in New Zealand? If so, with what results?

The Orchards, Gardens, and Apairies Division :—

The spray referred to above has been tested by the Department, but the results obtained were not at all satisfactory.

The Bordeaux mixture has proved the most reliable for control of black-spot under New Zealand conditions, provided, of course, the directions set out in the departmental spray leaflet are carefully adhered to, and fresh lime is used.

BEEKEEPING.

"TYRO" :—

1. When examining a hive to cut out the queen-cells should the bees be brushed off the comb? They get savage if they are, yet it is (to me) hard to detect the cells when there are numerous bees crawling over and some clustered stationary upon the comb.
2. Should one take the honey in the brood-space, or let the bees have it and only take that from the super at this time of the year?
3. One of my hives (on which I had to put a super to give more room), no matter when I go to it, hums like a steam-engine, and is very strong. Another not so strong is practically quiet and seems dead, as though the bees had flown. Yet upon opening it I find the bees working and eight out of ten frames well filled, and yet there is no continued *hum*, just a subdued *rustling* of the bees. Does the queen make the hum, or is it the strength of the colony that does it?

The Director of Orchards, Gardens, and Apairies Division :—

1. It is quite unnecessary to brush the bees off the comb, but should too many be adhering a sharp perpendicular shake inside the hive will dislodge as many as required.

2. It is customary at this period to remove any quantity of honey from the brood-chamber to the super, and replace with clean empty combs, thus giving the queen plently of room to lay her eggs.

3. The humming referred to is a sign of strength and prosperity within the hive. All strong colonies do this when nectar-gathering. The hive with the subdued rustling will probably commence humming on gaining greater strength. It is thought that the noise has something to do with ripening the nectar and evaporating the surplus moisture.

SUBSOILING BY EXPLOSIVES.

"ENTHUSIAST," Lotus Bay, Auckland :—

Have the attempts to subsoil land at Weraroa by means of explosives been a success? What depth were the holes, what bore, what distance apart, and what weight and variety of explosive?

The Fields and Experimental Farms Division :—

Subsoiling with explosives has not been attempted at Weraroa. A trial with explosives for draining purposes was undertaken. Holes were put down 15 ft. apart, with a 2 in. auger, to a depth of 5 ft.; an 8 oz. charge was put in each hole, with the result that the ground was broken up for several feet around and also to the bottom.

WEED FOR IDENTIFICATION.

MR. C. D. HUSBAND, Raglan :—

Will you kindly tell me the name of the enclosed weed, and whether it is detrimental to stock?

The Biologist :—

The specimen submitted is tarweed (*Bartsia viscosa*), an extremely common weed in many pastures where the drainage is poor. It has been noted that top-dressing with phosphatic manures has a decided effect in reducing this weed.

PLANT FOR IDENTIFICATION.

"WEST COAST," Whangape :—

I enclose herewith a plant for identification. I am told that it is a very bad noxious weed, and that it is prevalent in many places in the North of Auckland district. I found it growing upon my section. It was surrounded by many seedlings. I suppose that the wind has blown the seed from an adjoining Native holding, where there are a great many plants.

The Biologist :—

The specimen forwarded is identified as the marguerite daisy (*Chrysanthemum maximum*). It is regularly grown in gardens under the name of the "Shasta daisy," and is naturalized in odd localities in both Islands. Unlike its near relative, the ox-eye daisy, it does not appear to be a serious weed.

BLIGHT ON PEACH-TREES.

MR. S. WHITBURN, Ngaruawahia :—

Will you kindly inform me of the cause of several of my peach-trees withering away, as some kind of blight seems to have affected the fruit? The peach exudes

a kind of gum, turning quite yellow and falling off the trees. In the early part of flowering nothing could be better than the show of fruit, but now not a peach on most of the trees is coming to profit. Perhaps if you cannot go into these particulars a few of those leaflets which you refer to in the *Journal of Agriculture* may help me to save the trees from completely failing.

The Director of the Orchards, Gardens, and Apiaries Division :—

It is not easy to tell from your description. If possible, please send some specimens of both branches and fruit. It will afford me pleasure to make a microscopic examination and let you know the result.

SWARM OF BEES.

MR. EDGAR S. CLARKE, Clarewood, Dunedin :—

For three or four years now a swarm of bees have taken possession of the end wall of our wooden church. They get in under the boarding outside and make their nest between that and the lining. We have had the boards off two years, and worked them out, and thought we were rid of them, but the next season they came back again, and are here again this year. Can you please advise us what to do to drive them off ?

The Orchards, Gardens, and Apiaries Division :—

The only way to get rid of the bees permanently would be to take some of the boards off the side of the building and remove all the comb they have built and the honey they have gathered. Thoroughly sprinkle the place with carbolic, and keep the bees away when doing the work by having crude carbolic acid on the fuel in the bee-smoker. When replacing the boards be very careful to leave no aperture where the bees could again obtain access.

GOOD BOOK ON THE HORSE.

"NULLI SECUNDUS," Waikawa Valley, Southland :—

Please inform me where I can obtain a good book on the horse—one which thoroughly deals with the subject. Price no object.

The Live-stock and Meat Division.—

We would advise you to purchase the work entitled "The Horse in Health and Disease," by Professor J. Wortley Axe, M.R.C.V.S. This was published a few years ago, in nine well-bound illustrated volumes, at a price of £5. We think the work, which is thoroughly up to date, could now be purchased from Messrs. Whitcombe and Tombs, or other large booksellers, at a cost of £3 10s.

POISONING WILD PIGS.

MR. T. RAMSAY, Hyde, Central Otago :—

I notice in your issue of the 20th December—in replying to a query by "Iki Iki," Waerenga—you state that pigs poisoned by aresnic or phosphorus would be a danger to sheep-dogs. It is a common practice amongst rabbiters to feed their dogs on rabbits that have been poisoned by phosphorus, and, provided care is taken to take the inside out of the rabbit, there is no danger, as it is the stomach that contains the poison, and if a dog eats the stomach of a phosphorus-poisoned rabbit it is likely to prove fatal. Wild pigs were plentiful in this district until poisoning rabbits with phosphorized grain commenced, then they speedily disappeared. Probably they ate the grain laid for rabbits, and, as the rabbiters were in the habit of leaving the skinned carcases behind, they would also eat these, stomachs included. I do not think pigs poisoned by phosphorus would constitute any danger to dogs, as they would not be likely to get at the stomach.

The Live-stock and Meat Division :—

If the stomach and intestines were carefully removed from the pigs, as in the case of the rabbits, phosphorus would do no harm to the dogs. We do not see what would prevent dogs getting at the stomachs of the dead pigs otherwise.

PENNYROYAL.

"ENQUIRER," Waverley, Wanganui :—

Is it true that pennyroyal causes abortion amongst cows ?

The Live-stock and Meat Division :—

We have no evidence that it does.

KILLING GORSE.

"ENQUIRER," Waverley, Wanganui :—

Is grubbing the most, or the only, efficient method of killing gorse ?

The Fields and Experimental Farms Division :—

It is found that grubbing is really the most efficient method. There are a number of fairly effective weed-destroyers which are applied in the form of spraying, but these only destroy the top growth and the roots are seldom, if ever, affected. Grubbing has then to be resorted to to get these out, so that the land may be cultivated.

APRICOT-DISEASE.

"NOVICE," Renwick, Marlborough :—

I am sending under separate cover some specimens of fruit which have fallen from an apricot-tree in my garden. The tree is not overloaded. Last season it had a much larger crop, but the fruit did not drop off as they have done this season. The tree is well sheltered, and is about 14 ft. from the house. The downpipe from the roof discharges near the tree, and the water all goes towards the tree. Do you think it is getting too much water ? There has been rain practically every day for the last three weeks. I notice that the majority of the fallen fruit are better developed on one side, the other side generally being flat or hollow. Do you think that is the work of some kind of blight or fungus ?

The Orchards, Gardens, and Apiaries Division :—

The apricot specimens on arrival here were not in a suitable condition for a satisfactory examination. It appears, however, that during the wet spring experienced the ground round the tree has been kept too damp by the water discharged from the downpipe.

LUCERNE.

"NEW CHUM," Okania, Matamata :—

How old should lucerne be before you save the seed for planting again ?

Is it possible to transplant the lucerne-plant, say, into places where they have missed ? When would be the best time to transplant, if possible ?

The Fields and Experimental Farms Division :—

1. Plants should be two years old before suitable seed can be saved for sowing.

2. It is possible to transplant young seedlings, but this course would not be recommended. There would be more probability of success by resowing the bare patches.

THE WEATHER FOR DECEMBER.

D. C. BATES

BETWEEN the 1st and the 22nd of the month the distribution of atmospheric pressure was such as to cause extremely unsettled weather and an abundance of rainfall. In nearly every instance the disturbance was of a cyclonic type, the most intense being the one whose centre passed through Cook Strait on the evening of the 16th, with a barometric reading of 28·98 in. at Wellington. This cyclone moved very rapidly, and in this respect was in marked contrast to one prevailing between the 9th and the 14th. Of the latter, following is given approximately as the position of its centre on the different days while it was under review:—

Day and Date.	Approximate Position of Centre.
Mon., Dec. 8	.. 500 miles N.W. of Cape Maria van Diemen.
Tues., Dec. 9	.. 200 miles W.N.W. of Cape Maria van Diemen.
Wed., Dec. 10	.. 280 miles N.W. of Cape Egmont.
Thur., Dec. 11	.. 160 miles W.N.W. of Farewell Spit.
Fri., Dec. 12	.. Off the west coast of the South Island.
Sat., Dec. 13	.. Off the east coast of Otago.
Mon., Dec. 15	.. 650 miles E.S.E. of New Zealand.

On the afternoon of the 20th the winds blew strongly from the south with heavy passing showers in the east coast districts, but this southerly was of short duration, and the weather afterwards gradually improved, fair and warm conditions setting in and continuing to the end of the month, although westerly storms were in evidence to the westward of New Zealand and passed away south.

Precipitation was below normal in the western and south-western districts of the South Island, but nearly all other parts of the country experienced an abnormally wet December.

DISTRICT NOTES.

Chiefly from Telegraphic Reports.

District.

1. From the beginning until the 20th of the month weather-conditions were extremely unsettled and at times very squally. During this period heavy showers were frequent, but the daily totals were not excessive except on the 9th, when over an inch was measured at various stations. On the 20th fair weather set in, and warm and dry conditions were experienced for the remainder of the month. Both air temperature and pressure were below normal, while precipitation was about the average.

172° 30' E.
Cape Maria Van Diemen
Russell
Hokianga Head
Kaipara Sig. Stn.
Auckland
Manukau Hds
Thames
Hamilton
Raglan
Kawhia
Tauranga
Cambridge
Rotorua
Taupo
East Cape
Gisborne
New Plymouth
Cape Egmont
Napier
Patea
Wanganui
Palmerston
Foxton
Castlepoint
Farewell Spit
Nelson
Blenheim
Wellington
Cape Foulwind
Westport
Cape Campbell
Greymouth
Hokitika
Kaikoura
Bealey
Lyttelton
Christchurch
Ashburton
Okuru
Mackenzie Country
Timaru
Queenstown
Oamaru
Clyde
Port Chalmers
Dunedin
Puysegur Pt.
Balclutha
Invercargill
Nuggets
Bluff
N.Z. MEAN TIME
N
W
E
S

District.

2, 4. Weather similar to district No. 1. The aggregate rainfall was above the average generally, the difference varying considerably, from slightly in excess to over double at some stations.

3, 5, 6. The rainfall exceeded the average by from 20 to as much as 70 per cent., this owing to very showery conditions prevailing during the greater part of the month. Some stations recorded heavy rain about the 9th, and on this day Turangamoana measured over 3 in., 2·50 in. falling in two hours between 6 and 8 a.m. The duration of sunshine was much lower than is usual for December.

7. Changeable and showery weather was experienced in the first half of the month, and fair conditions ruled in the latter half. Rainfall was about normal, and at some stations slightly below.

8. The total rainfall was considerably in excess of the average in this district, most of the precipitation taking place in the nature of showers during the first half of the month. Some heavy falls occurred on the 7th, 10th, and 17th, and on the latter date a thunderstorm was experienced at several stations.

9, 10. Over double the average rainfall was recorded in most parts of these two districts. The heaviest twenty-four hours fall occurred on the 16th, many stations measuring over 2 in. Dull and misty, and at times very squally, weather ruled until the 20th, after which conditions became more favourable.

11, 12, 13. In the extreme north of district No. 11 there was an excess of the average rainfall, but the whole of the western districts recorded below normal, the difference ranging from about 15 per cent. to as much as 65 per cent., and even a greater deficiency was experienced in the high-level stations. The greatest fall was usually on the 12th, but although there were a greater number of days on which rain fell the individual falls were not generally excessive. Unsettled conditions prevailed between the 1st and 3rd, the 10th and 21st, and on the 28th and 29th. Fair weather was generally the rule during the remaining portions of the month.

14, 18. With the exception of the last ten days the month was one of unsettled and wet weather. Rainfall was more than double the average, and in many cases it was the heaviest month's fall for the past year.

15. The high country in this district recorded only about half the average rainfall. With the exception of a heavy fall on the 19th, most of the precipitation was in the nature of showers. Fair to cloudy weather predominated.

16. Heavy rain fell on the 19th, and showery conditions from the beginning of the month until the 22nd accounted for an excessive total fall for the month. Fine and warm weather prevailed afterwards.

17, 25. At a few stations in these districts, owing to heavy rains on the 7th, 12th, and 19th, the month's total was in excess of the average, but generally it was about normal or slightly below. On the 12th Gore reported 1·95 in., and on this day a "cloud-burst" was reported at Waikaka Valley. Except during the last week, when conditions were oppressively warm, the weather was unusually unsettled for December.

19, 24. The rainfall was abnormally high in all these districts, many stations recording more than double the mean. The greatest falls occurred generally on the 10th, 11th, and 19th, and on most of the days between the 1st and 21st there was some rain. From then on to the close of the month warm and dry conditions were experienced.

In the orchard at the Ruakura Farm of Instruction the apple Gravenstein shows this year for the first time a payable return. Up to the present season only a few blossoms set on this variety, and this caused it to be placed amongst varieties unsuitable for the soil and climate. The trees are eight years old. On the other hand, Willie Sharp is a constant bearer, and an important point in its favour is that it is blight-proof.—*A. W. Green.*

THE FRUIT CROP.

The officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of December :—

Whangarei.—Apples : Heavy to medium. Lemons : Recovering. Nectarines and peaches : Heavy all round. Pears : Average crop. Plums (English and Japanese) : Fair crop. Strawberries : Heavy crop. Tomatoes : Fair crop. The weather has been bad, rain falling on almost every day.—*J. W. Collard.*

Auckland North.—Apples : Good crop ; early varieties being marketed in large quantities ; prices low. Cherries : Crop practically finished. Lemons : Selling at high values. Nectarines : Crop not up to expectation ; continued wet weather causing a great deal of brown-rot. Peaches : Heavy crop ; values low ; canneries not yet commenced operations. Pears : Average crop ; *Fusicladium* rather prevalent, owing to humid conditions throughout this and last month. Plums (English) : Have not set as well as promised. Plums (Japanese) : Quite a fortnight earlier this year ; being marketed now in large quantities ; values low. Strawberries : Crop now thinning off ; values low. Tomatoes : Fair crop, but continued wind and blight have reduced them considerably.—*W. C. Thompson.*

Auckland South.—Apples : Looking exceedingly well ; heavy crop will be gathered ; prices for those sent to market not too good. Apricots : Those now being picked are of fair sample, and are realising high prices. Lemons : Heavy crop, looking well. Nectarines : Heavy crop. Peaches : Fair crop, Briggs's having set better crop than for seasons past. Pears : Good crop ; scab troublesome in the early part of season, but now practically free. Plums (English) : Far better crop than for years past. Plums (Japanese) : Crops patchy ; better than anticipated ; crop about average. Strawberries : Plants looking well and ripening freely. Tomatoes : On the whole looking well ; some places blight has made its appearance ; first fruit (outdoor) sent to market early this month. The weather was wet and boisterous in the early part of the month, but towards the end very hot and muggy weather was experienced.—*N. R. Pierce.*

Hamilton.—Apples : Crops developing satisfactorily ; wet weather during the month has hindered spraying operations ; scab has been very prevalent ; early ripening varieties are coming forward in fair supply. Apricots : Very scarce ; prices for good grades are very high. Cherries : All gathered with the exception of the late pie-varieties. Gooseberries : All gathered. Lemons : Supplies scarce. Nectarines : Crops looking fair. Peaches : Ripening earlier than usual ; owing, possibly, to the continued wet weather, the fruit is rather inferior in quality. Pears : Crops looking very fair. Plums (English) : Fair crop ; early varieties selling freely. Plums (Japanese) : Scarce. Strawberries : Practically finished. Tomatoes : Crops looking fair ; blight rather troublesome. Walnuts : Crops light.—*T. E. Rodda.*

Poverty Bay.—Apples : Very good crop. Apricots : Very poor crop. Cherries : Fair crop. Gooseberries : Good crop, but weather rather unfavourable for harvesting. Lemons : New crop promises well. Nectarines : Very fair. Peaches : Good, but weather unfavourable. Pears : Carrying a fair crop. Plums (English and Japanese) : Poor crop ; not up to expectations. Raspberries : Medium crop. Strawberries : Good crop. Tomatoes : Poor at present. Walnuts : Good. Since last report there has been an unfavourable change in the weather, the district having experienced cold, showery weather, with occasional very high winds. In the first week in December a gale did considerable damage in exposed positions to fruit and tomato crops. Vegetables generally are plentiful. Potatoes : Good crop.—*W. R. L. Williams.*

Manawatu and Wairarapa.—Apples : Still indications of a good crop of almost all varieties, although boisterous weather early in the month did considerable damage, bringing large quantities to the ground ; apple-scab not quite so bad as anticipated ; quite a lot of Bordeaux-burning this season, while lime-sulphur

has been responsible for the dropping of foliage in some districts. Cherries: Disastrous season for cherry-growers all through district, owing to abnormal quantity of rain; prices good where cherries are sound, but the great majority are cracked, being fit only for jam-making; one grower estimates loss at over £100. Gooseberries: Good crop; almost all picked. Nectarines and peaches: Average crop of both varieties; Briggs's Red May now bringing good price on the market; later varieties looking very healthy. Pears: Heavy crop of all varieties; pear-slug made its appearance at beginning of month, being kept in check with arsenate of lead. Plums (English and Japanese): Crops medium. Tomatoes: Doing well; very little blight noticeable.—*G. Stratford.*

WANGANUI.—Apples: Average crop of fair quality. Apricots: Quality discounted by heavy weather. Cherries: Heavy rains caused serious damage. Gooseberries: A good crop has been harvested. Lemons: Have blossomed freely and are setting well. Nectarines and peaches: Moderate crops now being harvested; quality very fair. Pears: Prospects well maintained. Plums (English): Prospects well maintained. Plums (Japanese): Crops generally heavy, quality right, where trees are not overloaded. Raspberries: Some handsome plantations have been observed. Strawberries: A fair crop being gathered. Tomatoes: Heavy crops under glass; outside crops backward. Heavy wet weather during first half of the month discounted fruit prospects generally, especially in exposed and undrained localities.—*W. C. Hyde.*

HASTINGS.—Apples: Heavy crops; early varieties coming forward; prices very satisfactory. Apricots: Short; prices very good. Nectarines and peaches: Fair; prices better than last season; attacks of ripe-rot fungus causing considerable uneasiness. Pears: Good crops of a few early varieties coming forward; prices good. Plums (English): Fair crops. Plums (Japanese): Light crop; ripe-rot fungus in evidence. Raspberries: Very good crop. Tomatoes: Field crops coming on very well. Walnuts: Good.—*J. A. Campbell.*

WELLINGTON.—Apples: Looking well, although mildew has had a good chance to develop during the wet weather experienced. Apricots: Poor crop. Cherries: Crop almost finished. Gooseberries: Good crops harvested; one grower forwarded to the markets over 10 tons. Nectarines: Poor crop. Peaches: Fair; early varieties being marketed; several attacks of curl noticed. Pears: Good; varieties subject to spot suffered very badly. Plums (English): Fair average crop; silver-blight is prevalent. Plums (Japanese): Good crops in districts that escaped the frosts. Raspberries: Fair crop. Tomatoes—(Hothouse): Fair crop. Tomatoes (Outside): Crops are suffering with "Irish blight," wet weather hindering the spraying. In districts where good lime is not procurable the Bordeaux mixture should be tested.—*T. C. Webb, jun.*

NELSON.—Apples: Crops have set very patchy, continual rain and high winds up to 21st December caused fruit to drop very much, noticeably Cox's, Jonathan, and Sturmers; these, I should say, are 20 per cent. below normal. Apricots: Have also suffered through the wet, a great deal of fruit being cracked; otherwise there is a good crop. Cherries: Now finished; good prices are reported to have been obtained. Gooseberries: A good crop of these has been gathered, and prices have been lower in consequence. Nectarines: A good crop; some varieties have shed a great many of late. Peaches: Early sorts are mostly disposed of and have turned out only a medium crop; Triumph and Wiggins are fairly good, as also are Muir and Elberta and other late varieties. Pears: Good crop, and looking well; Black-spot appeared badly when the fruit was setting, but most orchards are now looking well, the later sprayings proving very effective. Plums (English): Good crop. Plums (Japanese): Good crop. Raspberries: Now being picked; promise a heavy yield. Strawberries: Main crop finished; plenty of berries, but not too good quality; most of the fruit went into the factories. Tomatoes: Blight has been bad in many houses, also outside, the bottom bunches on most being a failure. Potatoes have suffered badly with Irish blight. Walnuts: Plenty of nuts, but badly affected with bacteriosis.—*J. H. Thorp.*

BLENHEIM.—Apples: Good crop; spraying with arsenate of lead is now in full swing. Apricots: Good crop; shot-hole fungus has been bad. Cherries: Good crop, but owing to the wet season a lot were spoiled by cracking, &c. Gooseberries: Good crop; nearly all gathered. Nectarines: Crop looking well. Peaches: Good crop, but foliage very much damaged by brown beetle. Pears: Good crop; pear-scab very much in evidence, owing, no doubt, to the moist atmosphere, which, as most people know, is very favourable to the development of the fungus. I

have advised the using of arsenate of lead for leech; also a mixture of Bordeaux mixture with the arsenate of lead for control of scab. Tomatoes: Fruit setting well; a few under glass being gathered. Walnuts: Setting well.—*B. G. Goodwin.*

NORTH CANTERBURY AND WEST COAST.—Apples: Fair crop. Apricots: Light crop. Cherries: Medium crop. Gooseberries: Good crop. Nectarines: Fair crop. Peaches: Good crop; turning out better than expected. Pears: Light crop. Plums (English): Fair crop. Plums (Japanese): Light crop. Raspberries: Fair to good crop. Strawberries: Good crop. Tomatoes: Inside crops looking well, outdoor crops not looking well, weather being against them. Apples and pears will not be as good a crop as I anticipated earlier in the season, as they have dropped rather badly. Black-spot is also fairly prevalent. The weather has been so wet during the last six weeks that it has been almost impossible to continue spraying. Cherries suffered a great deal with the wet, many growers losing good quantities owing to the cherries cracking so badly.—*W. J. Courtier.*

CHRISTCHURCH.—The weather during the former part of December was very unseasonable, heavy rains preventing orchard operations. Apples: Considerable falling of fruit; present indications point to a disappointing crop; black-spot spread very rapidly during early part of month and negligent orchardists will have much unsaleable fruit. I noticed the first codlin-moth grubs at the beginning of the month. Cherries: Heavy rain did much damage; berries cracked badly. Gooseberries: Now ripening; short crop. Pears: Holding much better now; crop as indicated last month; black-spot developed and spread very rapidly this month. Plums: Filling out nicely; average crop. Raspberries: Yielding well; good picks promising next month. Strawberries: Season advanced; quality poor. Tomatoes (indoor): Picking lower trusses; top branches promise a good set; blight is bad in some houses, and these are a decided contrast to those systematically sprayed with Bordeaux mixture. Where Bordeaux has been used regularly at intervals of about fourteen days no trace of disease is to be found, the plants being sturdy, vigorous, and the fruit set well. Many outdoor growers had their plants cut badly by frost on 1st December.—*Gordon Esam.*

DUNEDIN.—Apples: Looking well. Apricots: Looking well. Cherries: Picking. Gooseberries: Crop nearly over. Nectarines, peaches, pears, plums (English and Japanese): Looking well. Raspberries: Picking. Strawberries: Still picking. Tomatoes: Looking well. Walnuts: Fair crop. An innovation in the means of transit of fruit to the nearest railway-station, often a considerable distance in this district, is being tried this season on both the Roxburgh–Edievale Road and the Pembroke–Cromwell–Clyde Road. Messrs. Waigth and Sons, of Roxburgh, have installed a large 50-h.p. motor-lorry on the former run, and Mr. William Bell, of Cromwell, has installed two large motor-lorries on the latter run. If the running of these vehicles is successful it should prove a boon to many fruitgrowers of this district, as it means a considerable saving of time in the transit of their produce from the orchards to the markets, a big item with all fruitgrowers, not to mention the other numerous advantages.—*W. T. Goodwin.*

HONEY-CROP PROSPECTS.

THE Director of Orchards, Gardens, and Apiaries Division has received the following reports on the honey-crop prospects from the Apiary Instructors:—

AUCKLAND.—The bad weather-conditions reported last month continued up to Christmas, and the prospects of a fair crop were then very remote. Since, however, the weather has changed for the better, and honey is at the present time coming in freely, but what the crop is likely to be remains doubtful. By the time of the next report something definite may be known.—*G. V. Westbrooke.*

WELLINGTON.—The recent rains have thoroughly refreshed pastures. Should suitable weather now follow there is every prospect of a very good crop of honey. There will be no lines offering until this season's crop has been extracted.—*F. A. Jacobsen.*

CHRISTCHURCH.—Right up to the 18th December cold winds, rain, and occasionally snow, have been almost a daily occurrence. These unseasonable condi-

tions have kept everything backward. Many beekeepers had to feed to keep queens laying, although there are exceptions to the above in some sheltered localities, but as a general rule the prospects are not so good as this time last year. In the latter part of December an improvement came, and a good flow has at last set in, giving bees and beekeepers a better heart to work. A small shipment of graded honey left Christchurch at the end of the month, and another small lot is forward to be shipped in January.—*L. Bowman.*

DUNEDIN.—The clover pastures are looking excellent owing to a spell of fine weather. Should present conditions prevail there is every prospect of a good season. Beekeepers are delighted with the change. In the early part of December bad weather prevented the bees from working, and losses were reported owing to a shortness of stores.—*E. A. Earp.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

THE Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms and the market position of these products for the month of December :—

AUCKLAND.—Prices have been very unsteady during the month. A few consignments of inferior apples came forward and brought 2s. per half-case. Stone-fruits are in good supply. Apricots are selling at from 3s. 6d. to 10s. 6d. per 20 lb. case. Peaches average 3s. 6d., while plums average 3s. per case. Tomatoes are selling at from 6d. to 1s. per lb. Lemons, second class, are bringing 4s. to 6s., while choice are selling at from 8s. to 12s. per case.—*C. Craigie.*

WELLINGTON.—The holidays have interfered with business in the markets to a certain extent, and the supply of fruit has been small. Lately, however, fruit has been coming in freely and more regularly. Peaches are in fair supply, and are realizing up to 4s. 6d. per half-case. Burbank plums are plentiful at 2s. 6d. to 4s. per half-case. Tomatoes are in fair supply ; prices varied greatly during the month, but the average price was about 8d. per lb. Pears are in small supply, bringing up to 4s. per half-case. Apples : small supply and poor quality. Black and red currants are plentiful. All vegetables are in fair supply. New potatoes are bringing 6s. per cwt.—*T. C. Webb, jun.*

CHRISTCHURCH.—Small fruits are coming forward in good supply ; a decline can be anticipated now the holiday demand is satisfied. The rains in the early part of the month spoilt the quality of cherries, cracking being very noticeable. Waimate is now supplying large quantities of strawberries. Nelson peaches and tomatoes are arriving, the former in small regular shipments, the latter only in small lots. Quality and packing is good. A few local peaches are also on the market. Burbank plums are arriving in splendid order from Auckland. The first local hothouse grapes were retailed at 4s. per lb. during Christmas week. The following prices are based mainly on sales for the last three days of the month : Strawberries, 8d. to 10d. per lb. ; raspberries, 5d. to 6d. per lb. ; goose-berries, 3d. per lb., supply short ; currants, red and black, 3d. to 4d. per lb. ; cherries, 6h. to 10d. per lb ; peaches 4d per lb. ; plums, 4d. per lb. ; tomatoes, 9d. to 1s. per lb. ; cucumbers (mostly local hothouse), 6d. to 8d. per lb. ; peas, 1s. 2d. per peck, likely to decline ; potatoes (new), in good supply at 6s. to 7s. per cwt.—*Gordon Esam.*

DUNEDIN.—Some very choice lines of cherries have come forward, and the supply has increased considerably. Strawberries are still coming forward in fair quantities and in good condition. A few small lots of peaches, apricots, and plums came to hand from Clyde and Alexandra in good condition. Currants are in good order and fairly plentiful. The supply of tomatoes is very short. Ripe gooseberries : Supply very short, but condition good, with the exception of a few lines which arrived from the North Island in bad order. There are still a few

lines of Canterbury apples coming forward, and these arrived in splendid condition. There is only a small supply of grapes. Some very large consignments of new potatoes came to hand from Auckland and the supply locally has also been very good. Green peas are very plentiful. The supply of asparagus is very short, there being none offering towards the end of the month. There are small supplies only of the following vegetables: Cabbages, cauliflowers, radishes, silver-beet, and lettuces. Prices for the month ruled as follows: Apples, 11s. to 12s. per case; cherries, 6d. to 9d. per lb., up to 11d. for extra choice; strawberries, 5d. to 8d. per pottle; tomatoes, 11d. to 1s. 3d. per lb.; grapes, 2s. 6d. per lb.; gooseberries, 3d. to 4½d. per lb.; peaches, 5d. to 7d. per lb.; apricots, 4d. per lb.; currants, 3d. to 3½d. per lb.; plums, 4½d. per lb.; cauliflowers, 1s. 6d. to 2s. per sack; cabbages, 1s. 6d. per sack; green peas, 3d. per lb.; new potatoes, 1¼d. to 2½d. per lb.; asparagus, 4s. 6d. per dozen bundles.—*E. T. Taylor.*

BLUFF.—Local fruit has been in good demand this month owing to the shortage of imported fruit. Apples and tomatoes have arrived from Canterbury, and strawberries, cherries, and peaches from the Otago Central district. All fruit was very clean and well packed, and good prices have been realized. The prices ruling for the month were as follows: Strawberries, 6d. to 1s. 3d. per lb.; cherries, 9d. to 1s. 2d. per lb.; tomatoes, 10½d. to 1s. 6d. per lb.; apples, 10s. to 15s. per case; plums, 4d. per lb.; gooseberries, 2½d. to 3d. per lb.; black currants, 4d. to 5d. per lb.; peaches, 5½d. to 7d. per lb. Old potatoes are selling at £2 per ton, and new local potatoes at 1½d. to 2d. per lb., while new Auckland potatoes are bringing 10s. per cwt. Rhubarb is bringing 1½d. per lb. Cabbages: 4s. to 4s. 6d. per sack; green peas, 2½d. to 3d. per lb.—*R. Hutton.*

The most popular form of imparting the principles of agriculture to the rural population of Austria is the agricultural winter schools. These are continually increasing. At the present time there are ninety-one such institutions. As they are open only during five or six months of the winter season, and as but few of them possess a school farm, the instruction given is mainly theoretical, and includes subjects of general education as well as agriculture. For admittance pupils must possess the elementary knowledge given by primary schools. During the summer between the two courses the pupils work on their fathers' farms. After having frequented the schools they usually remain on their parents' farms, in the improvement of which they use the acquired knowledge, and at the same time set an example to their neighbours. —*Bulletin of the International Institute of Agriculture.*

Heretofore the work of the American Department of Agriculture has lain chiefly in the field of production, and even in this field it has been conscious of limitations. The chief difficulty has been to make its results known effectively to the great mass of the farmers who needed the knowledge. There can be little doubt that the Federal Department of Agriculture and the various State colleges and the best farmers have enough knowledge to revolutionize the nation if it could be conveyed to all farmers and they could be induced to utilize it. How to get this information to the last man on the farm has been one of the most troublesome problems confronting the Department. After many years an effective method has at last been devised. The demonstration plan has made its demonstration. The old lesson that personal contact is of the highest value has been taught.—*D. F. Houston, Secretary of Agriculture, U.S.A.*

COMMERCIAL INTELLIGENCE.

BARGING OF MEAT IN LONDON.

MR. A. CRABB, F.R.C.V.S., London Veterinary Officer of the New Zealand Government, reports as follows under the date of the 12th December, 1913:—

As you are aware, considerable criticism has been levelled against the use of barges for the conveyance of meat and against the condition of the barges so used, and I am therefore pleased to be able to report to you that a marked improvement is likely to occur in the near future. The Association of New Zealand Agents have been negotiating with storekeepers and barge-owners, with the result that after the 1st March, 1914, no meat controlled by members of the Association will be carried unless in barges which are properly surveyed, and this really means that almost the whole of the barges used in the transit of meat will be under control. It has been arranged that Lloyd's Registry of Shipping shall appoint surveyors, and that the barge-owners will submit their craft to such surveyors for examination each six months, and that such repairs, renewals, or alterations as are demanded by the surveyors shall be carried out.

THE MEAT-EXPORT TRADE.

UNITED STATES REGULATIONS.

THE following circular has been issued by the Director of the Live-stock and Meat Division to meat-exporters:—

The requirements of the American authorities in the case of meat shipped from New Zealand to United States ports are that each carcase or portion of a carcase shall have affixed to it a tag bearing the registered number of the meat-export slaughterhouse in which the stock was slaughtered, and the following wording, together with the Inspector's signature:—

"This meat has been examined by me, and by ante- and post-mortem veterinary inspection is found to be free from disease and suitable in every way for human consumption; and the meat has not been treated with chemical preservatives or other foreign substances injurious to health."

In the case of New Zealand meat originally shipped to England for sale there, but instead, after arrival, sent on to United States ports, the United States authorities are willing to accept this meat provided that the tags are worded as above, and, further, that these tags are affixed to the carcase by means of wire and seals. This cable is the first intimation we have received as to the necessity for affixing the tags in this way, there being nothing in previous communications to indicate that the use of twine for affixing the tags would be objected to. Further inquiry on this point is being made.

The regulations governing the inspection and handling of imported meat and meat products recently issued by the United States Department of Agriculture contain a special rule regarding transhipment in England, which reads as follows:—

"Occasional small consignments of meat from Australia or New Zealand are transhipped at some port in England for the United States. In order that these shipments may be allowed entry they must be accompanied when arriving in England by a proper meat-inspection certificate issued by an official veterinarian, as required by Food Inspection Decision 74, and the portion of shipment sent to

the United States must be accompanied by a copy of this inspection certificate, together with a statement relative to the transhipment and the amount transhipped. These statements should come from a proper official of Great Britain, and the whole be certified before an American Consul."

I give hereunder a copy of the veterinary meat inspection certificate as required by Food Inspection Decision 74, referred to above :—

"I hereby certify that the meat-product factory of the firm of is located in the meat inspection district of the province of ; that the animals killed in that establishment are subjected to competent official veterinary ante-mortem and post-mortem inspections ; that all of the meat sold by that firm is the product of animals free from disease ; and that all meat and meat-food products of that firm are free from chemical preservatives or other foreign substances injurious to health."

Copies of this inspection certificate can, if necessary, be furnished by Mr. Crabb, F.R.C.V.S., the New Zealand Government Veterinarian stationed in London, provided he is satisfied everything relating to the consignment is in order.

A copy of this inspection certificate is also required in connection with meat shipped direct from New Zealand to San Francisco. Also, as meat shipped to Vancouver is sometimes sent on from there into the United States, a similar certificate should accompany consignments of meat to that port. This certificate can be furnished by any Veterinary Officer now engaged in meat-inspection duty in New Zealand.

In addition the shipper must furnish a declaration worded as follows, which must be sworn before a United States Consular Officer :—

"I, the undersigned, do solemnly and truly declare that I am the manufacturer [agent, *or* shipper], of the merchandise herein mentioned and described, and that it consists of food or drug products which contain no added substances injurious to health. These products were grown in [*Country*] and manufactured in [*Country*] by [*Name of manufacturer*] during the year , and are exported from [*City*] and consigned to [*City*]. The products bear no false labels or marks, contain no [*some*] added colouring matter or preservative, [*Name of added colour or preservative*], and are not of a character to cause prohibition or restriction in the country where made or from which exported.

"Dated at this day of , 19 .

"(*Signed*) ."

This declaration is necessary with each shipment whether sent direct from New Zealand to San Francisco, sent into the United States via Vancouver, or via British ports.

In the case of boned beef, in addition to placing a tag inside each package it is necessary also to affix an inspection-tag on the outside of each bag by means of wire and metal seal.

Previous advice was sent to the effect that carcases or portions of carcases shipped direct to San Francisco must bear an inspection stamp upon certain parts of the carcase or portion thereof. This stamping of the meat is not now required by the United States Government, but there is no objection to it being done if desired by the importer.—*C. J. Reakes, D.V.Sc., M.R.C.V.S., Director, Live-stock and Meat Division.*

ARGENTINE TRADE WITH BRITAIN.

THE Department has received the following cablegram from Buenos Aires, dated 3rd January, 1914 :—

The following shipments of produce were despatched from the Argentine to the United Kingdom during December, 1913 (compared with December, 1912) :—

	1913.	1912.
Frozen beef (quarters)	124,000	136,000
Chilled beef (quarters)	275,000	154,000
Frozen mutton (carcases)	153,000	149,000
Frozen lamb (carcases)	83,000	78,000
Butter (cwt.)	5,737	15,059

STOCK IN QUARANTINE.

THE following stock were received into quarantine during the month of December, 1913:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
			SOMES ISLAND (WELLINGTON).		
1	Chihuahua dog ..	Male..	San Francisco	Mrs. A. S. Bedford	Ponsonby, Auckland.
1	,, ..	Female	Ditto ..	,,	Ditto.
1	Collie dog ..	Male..	London ..	F. W. Jones ..	Masterton.
			QUAIL ISLAND (LYTTELTON).		
2	Berkshire boars ..	..	London ..	Agricultural College	Lincoln.
1	Large black boar..	..	,, ..	,,	,,
1	Large black sow ..	..	,, ..	,,	,,
6	Suffolk ewes ..	..	,, ..	George Gould ..	Christchurch.
1	Suffolk ram ..	..	,, ..	,, ..	,,
4	Collie dogs ..	Male..	,, ..	James Lilico ..	Lochiel.

In 1911 the United Kingdom imported 23,097 cwt. of honey. Of this, British West India Islands supplied 8,370 cwt. and the United States of America 7,000 cwt.—*T. W. K.*

The weather at the end of the year at the Ruakura Farm of Instruction, being wet, wild, and comparatively sunless, provided ideal conditions for pastures, but the very worst for cereal crops, especially those in ear. These were badly lodged, and on the lodged portions the small birds took a very heavy toll. Notwithstanding the adverse weather the Ruakura Rust-resistant Oat kept free from rust, and gives every indication that the selection is a most valuable one.

The orchard of the Ruakura Farm of Instruction suffered severely from the storm on the 23rd October last. The visitation did not last an hour, but in that time eleven large trees were blown over. The high hedge, *Cryptomeria elegans*, protected the peach and nectarine orchards, so that the trees in this section did not suffer, and are carrying a heavy load of fruit. Ripe peaches of the "Sneed" variety were picked on the 29th November. This is the earliest on record, so that the season is much in advance of the corresponding period of last season. Ripe peaches of the same variety had not previously been gathered until the 17th December.

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
January,	1913	166,714	229,179	6,886	109,251	63,864	118,986	..	329	..	6,969	2,215	4,110	611 carcases pork.
,,	*1912*	*237,284*	*302,399*	*12,424*	*114,512*	*64,005*	*95,994*	..	..	*7,295*	*6,365*	*1,942*	*3,407*	*59* ,,
February,	1913	326,337	403,698	12,666	89,098	81,733	127,968	..	..	..	12,520	4,295	7,973	64 carcases pork.
,,	*1912*	*208,424*	*273,246*	*13,052*	*101,544*	*62,398*	*106,074*	*607*	..	..	*6,831*	*1,615*	*1,056*	..
March,	1913	86,224	210,166	7,428	47,560	59,844	49,661	..	115	..	12,552	7,662	4,043	250 carcases pork.
,,	*1912*	*324,192*	*518,402*	*20,201*	*64,925*	*49,308*	*70,022*	..	*4,980*	..	*3,832*	*1,352*	*2,644*	*16* ,,
April,	1913	303,937	647,948	16,834	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889	457 carcases pork.
,,	*1912*	*213,178*	*355,829*	*7,046*	*38,986*	*38,137*	*31,615*	*4,905*	*2,180*	..	*5,134*	*1,958*	*4,458*	..
May,	1913	418,221	731,520	22,073	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057	100 carcases pork.
,,	*1912*	*454,506*	*744,287*	*32,691*	*1,441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*	..
June,	1913	315,034	528,815	24,444	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439	588 carcases pork.
,,	*1912*	*170,738*	*287,697*	*24,605*	*558*	*7,712*	*18,138*	*9,160*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*	*221* ,,
July,	1913	215,713	331,353	14,030	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793	..
,,	*1912*	*291,097*	*371,474*	*29,457*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*	*210 carcases pork.*
August,	1913	161,593	178,263	13,129	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406	6 carcases pork.
,,	*1912*	*207,239*	*157,589*	*10,478*	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*	..
September,	1913	133,122	83,521	5,334	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049	16 carcases pork.
,,	*1912*	*44,657*	*40,759*	*1,174*	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,933*	*2,957*	*501*	*3,671*	..
October,	1913	14,122	25,735	580	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923	..
,,	*1912*	*51,263*	*15,393*	*3,882*	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,396*	*4,193*	*401*	*9,075*	..
November,	1913	20	1,479	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314	..
,,	*1912*	*54,175*	*8,286*	*282*	*140,751*	*57,181*	*33,305*	*3,680*	*40,896*	*13,892*	*9,866*	*1,911*	*5,466*	..
December,	1913	128,087	86,890	8,909	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273	..
,,	*1912*	*117,740*	*106,310*	*4,774*	*119,885*	*66,213*	*44,789*	*5,868*	*30,490*	*10,070*	*3,816*	*2,613*	*3,686*	..

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST DECEMBER, 1913.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. Hinds.	Beef. Fores.	Butter. New Zealand.	Butter. Danish.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila.	Wheat. Short-berried.	Wheat. Long-berried	Oats. Sparrowbills.	Oats. Danish.
1913.							d.	d.	d.	d.	d.	d.															
Oct. 4	..	..	..	..	..	..	4⅝	4 7/16	5⅝	5 15/16	4½	..	..	..	..	..	..	29/15/0	25/15/0	30/0/0	29/15/0	..	30/0/0	..	..	..	..
,, 11	..	..	..	..	..	..	..	..	5 5/16	5 1/16	4¼	3¼	..	..	..	..	..	..	..	30/0/0	29/15/0	25/15/0	26/10/0	..	36/0	23/0	20/6
,, 18	..	..	..	..	..	2/4	4⅝	4⅜	5 1/16	5 3/16	4½	3⅜	..	134/6	..	..	65/6	29/0/0	25/15/0	30/10/0	29/10/0	26/0/0	30/10/0	..	..	..	..
,, 25	..	..	..	..	..	..	..	..	5½	5⅛	4⅜	3 5/16	..	134/6	..	..	..	29/5/0	25/15/0	30/10/0	29/5/0	25/15/0	30/0/0	..	..	..	..
Nov. 1	..	..	..	..	..	..	4⅝	4⅞	5⅜	5⅛	4½	3⅜	..	135/0	..	..	..	29/5/0	25/15/0	30/10/0	29/5/0	25/15/0	30/5/0	..	..	..	..
,, 8	..	..	..	..	..	..	4⅝	4½	5⅜	5⅛	4½	3⅝	128/0	132/0	64/0	64/0	65/0	28/15/0	25/15/0	30/10/0	28/15/0	25/15/0	29/15/0	..	35/6	..	..
,, 15	1/3¼	1/3½	1/4	1/7	1/10	2/3½	4⅝	4⅝	5½	5⅛	4½	3⅜	126/0	131/0	64/0	64/0	66/0	28/10/0	25/10/0	30/5/0	..	..	29/15/0	..	..	..	..
,, 22	..	..	..	..	..	..	..	4⅜	..	..	..	..	126/0	131/0	64/0	65/0	67/0	28/5/0	25/10/0	30/0/0	28/10/0	25/15/0	29/10/0	..	..	..	..
,, 29	1/3	1/3¼	1/3½	1/7	1/9¾	2/3	..	4¾	5⅜	..	4½	3⅞	128/0	..	65/0	65/6	68/0	28/0/0	25/17/6	30/0/0	27/12/6	25/5/0	29/10/0	..	..	..	..
Dec. 6	..	..	..	..	..	..	..	5	5⅞	5½	4½	4	130/0	132/0	66/0	67/0	68/0	27/0/0	24/0/0	29/0/0	26/15/0	24/15/0	28/5/0	..	..	..	..
,, 13	1/2¾	1/3	1/3½	1/6¾	1/9½	2/2¾	..	..	6¼	..	..	..	130/0	133/0	66/0	67/0	68/0	27/0/0	24/0/0	29/0/0	26/10/0	24/10/0	27/15/0	..	..	..	..
,, 20	1/2½	1/3¼	..	1/6¾	1/9¼	2/2½	..	5	6½	..	..	..	128/0	133/0	66/0	67/0	68/0	26/0/0	23/15/0	27/0/0	..	..	26/0/0	..	..	..	..
,, 27	..	..	..	..	..	..	..	..	6⅜	..	4½	4	124/0	133/0	66/0	67/0	68/0	26/0/0	23/10/0	27/0/0	..	..	26/0/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

DECEMBER.

Hemp.—The total number of bales graded was 14,496, as compared with 13,541 for the corresponding month of last year, an increase of 955 bales. For the twelve months ending 31st December, 1913, the number of bales graded was 169,419, as compared with 99,922 for the previous twelve months, the increase being 69,497 bales.

Tow.—During the month 4,706 bales were dealt with, as compared with 5,331 for the corresponding month of last year, a decrease of 625 bales. For the twelve months ending 31st December, 1913, the number of bales graded was 57,606, as compared with 31,768 for the previous twelve months, an increase of 25,838 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF DECEMBER, 1913.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	503	833	1,245	85	12	..	2,678
Napier ..	..	..	232	31	..	..	..	..	263
Foxton ..	..	..	857	1,859	307	135	12	..	3,170
Wellington ..	..	58	2,014	2,394	684	57	5	..	5,212
Blenheim ..	..	..	256	11	..	..	..	..	267
Picton ..	..	126	165	..	..	9	..	..	300
Lyttelton ..	..	55	..	..	..	..	..	..	55
Dunedin ..	..	..	154	111	68	..	..	..	333
Bluff	..	..	466	1,187	484	81	..	..	2,218
Totals ..	..	239	4,647	6,426	2,788	367	29	..	14,496
Percentages of totals	..	1·66	32·05	44·33	19·23	2·53	0·2	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	1	435	559	134	1,129
Napier	72	..	13	..	85
Foxton ..	197	620	93	..	910
Wellington ..	210	632	412	28	1,282
Blenheim ..	36	2	5	..	43
Picton	22	88	67	..	177
Lyttelton ..	..	19	..	..	19
Dunedin ..	..	62	95	5	162
Bluff	..	204	609	86	899
Totals ..	538	2,062	1,853	253	4,706

Stripper-slips.—Passed for export: Auckland, 30; Foxton, 650; Wellington, 192; Bluff, 5—total, 877. Condemned: Foxton, 51; Wellington, 7; Bluff, 15—total, 73.

NEW ZEALAND-SAN FRANCISCO TRADE.

FOLLOWING are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since August last:—

—	"Moana," 15th August.	"Willochra," 13th Sept.	"Tahiti," 10th Oct.	"Moana," 13th Nov.	"Aorangi," 5th Dec.
Gum, packages	34	..	21	..	57
Seeds, sacks	23	120	365	..	..
Grain, &c., sacks	72	28	76	34	83
Meat, cases	205	60	950	240	616
Onions, cases	10	2	..	..	2
Potatoes, sacks	15	3	9	2	6
Sundries, packages	157	422	247	16	1,825
Butter, boxes	7	545	4,415	4,198	5,815
Hemp, bales	391	377	..	131	..
Frozen lamb, carcases	2	2	2	2	4
,, mutton, ,,	54	..	..	..	..
,, veal, ,,	..	..	..	..	..
,, beef, quarters	..	..	..	..	..
,, sundries, packages	5	7	..	..	..
Timber, pieces	..	..	136	..	..

NEW ZEALAND-VANCOUVER TRADE.

FOLLOWING are the shipments of produce for Vancouver and North American ports from New Zealand since July last:—

—	"Makura," 5th July.	"Niagara," 2nd August.	"Marama," 30th August.	"Makura," 27th Sept.	"Niagara," 25th Oct.	"Marama," 22nd Nov.
Butter, boxes	4,401	720	1,753	10,062	18,335	17,009
Mutton, carcases	65	1,014	1,500	1,119	1,189	1,450
Beef, quarters	3,520	7,195	4,217	955	259	..
Veal, carcases	..	..	74	171	291	285
Frozen sundries, packages	471	42	..	2,202	12	55
Wool, bales	835	..	103	207	320	28
Grass-seeds, beans, &c., sacks	75	..	38	9	..	2
Hides and skins, sacks, &c.	748	200	1,468	3,533	4,144	2,947
Onions, cases	..	..	..	..	..	..
Sheep-skins, bales	522	..	..	..	146	..
Jam, cases	20	1	53	..	74	101
Sundries, packages	189	..	1,406	2,586	1,018	2,183
Potatoes, crates	..	..	..	..	..	..
Kauri-gum, packages	..	..	..	180	267	300
Hemp, bales	97	930	116	284	380	129
Rabbits, crates	15	100	500	..	100	..
Timber, pieces	..	..	..	2,819	2,709	468
Eggs, cases	..	..	..	..	336	..
Meats (canned, &c.), cases	..	..	..	..	60	52
Fertilizers, sacks	..	..	..	..	914	..

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of December:—

Port of Shipment.	Horses.				Cattle.			Sheep.			Pigs.		Dogs.	
	To Australia.	To Pacific Islands.	To Vancouver.	To India.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.
Auckland ..	..	19	..	..	..	23	..	..	172	..	..	28	2	1
Wellington	..	..	..	..	..	16	..	..	..	15	..	..	..	..
Lyttelton ..	1	..	..	..	..	..	..	..	..	20	..	..	..	..
Dunedin ..	..	..	..	..	..	..	..	..	..	106	..	..	..	..
Invercargill	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals ..	1	19	..	..	..	39	..	..	172	141	..	28	2	1

Auckland also exported 9 crates of poultry to the Pacific islands.

Following are the particulars of horses exported: 1 thoroughbred stallion, 1 trotting stallion, 11 geldings, 6 hack mares, and 1 pony mare.

PRODUCE IMPORTED.

THE following return, compiled by the Customs Department, shows the total importations into New Zealand during the month of December, 1913, of agricultural and farm products:—

Item.	Quantity.	Value.
		£
Bran	..	..
Butter	..	..
Cheese	5 cwt.	24
Chaff	..	..
Fruits, fresh; all kinds	3,114,410 lb.	32,898
Barley	..	..
Oats	..	..
Wheat	12 centals	8
Onions	2,426 cwt.	1,540
Pollard and sharps	..	..
Potatoes	2 tons	38
Seeds, grass and clover	4,897 cwt.	16,293
Total value imported ..	..	£50,801